R & M No.3820

R &M No.3820

PROCUREMENT EXECUTIVE, MINISTRY OF DEFENCE

Aeronautical Research Council
Reports and Memoranda

AERODYNAMIC DATA FOR THREE SUPERCRITICAL AEROFOILS RAE (NPL) 9515 and 9530, and RAE 9550 PARTS I and II

by

J.L. Fulker

Aerodynamics Department, RAE Bedford

London: Her Majesty's Stationery Office
1978

PRICE £12 NET

AERODYNAMIC DATA FOR THREE SUPERCRITICAL AEROFOILS, RAE(NPL)9515 AND 9530, AND RAE 9550

By J. L. Fulker

Aerodynamics Department, RAE Bedford

Reports and Memoranda No.3820*

Part I (June 1974) and Part II (May 1975)

SUMMARY

Part I compares the experimentally determined aerodynamic characteristics of two 10½% thick supercritical aerofoil sections, RAE(NPL)9515 and 9530, over the Mach number range 0.3 to 0.88 and angles of incidence from -0.82° to 14°. The results are compared with the limited published results for aerofoils of a similar type.

Part II presents corresponding results for RAE 9550, a 12.2% thick supercritical aerofoil derived from an NLR shockless lifting aerofoil, tested over the Mach number range 0.4 to 0.82 and angles of incidence from 1° to 11°. The results are compared with theory and with the limited published results for an aerofoil of a similar type.

More detailed summaries are prefixed to the separate Parts, which are presented as self-contained Reports, beginning on pages 3 and 101 respectively.

* Replaces RAE Technical Reports 74082 and 75068 - ARC 36198 and 36262

*Part I

A COMPARISON OF EXPERIMENTAL RESULTS ON TWO SUPERCRITICAL AEROFOILS, RAE(NPL)9515 AND 9530

SUMMARY

Aerodynamic characteristics of two $10\frac{1}{2}\%$ thick supercritical aerofoil sections are presented. The results cover the Mach number range 0.3 to 0.88 and angles of incidence from -0.82° to 14°; they show that the sections can sustain supersonic flow over 70% of the upper surface chord, the supersonic region being terminated by a weak shock wave. Both sections have a drag-rise Mach number of about 0.8 at $C_L = 0.5$. At Mach numbers near 0.7 a remarkably high lift coefficient, of at least 1.2, is obtained before appreciable separation occurs. At low speeds $(M_\infty = 0.3)$ a similar value of lift coefficient is obtained on RAE(NPL)9530; this improvement over the maximum low-speed C_L obtained on RAE(NPL)9515 $\left(C_{L_{max}} = 1.0\right)$, is a consequence of the modified leading edge shape. These results compare favourably with the limited published results for aerofoils of a similar type.

---

* Replaces RAE Technical Report 74082 - ARC 36198

CONTENTS

1 INTRODUCTION

The development of regions of supercritical flow and the associated shock waves, and the way they limit the high subsonic performance of wings and aerofoils are well known; the continuous need for improved wing performance has resulted in a considerable amount of work on the subject. Besides the flow condition where the supercritical flow on a wing or aerofoil is terminated by a shock wave, there is great interest in the potential advantages of 'shock-free' flows. Here the aerofoil is designed to have a region of supercritical flow extending as far as possible over its upper surface, but with an isentropic (i.e. shock free) recompression to subsonic flow, by means of a continuous steady reduction of Mach number, along the surface. The achievement of such shock-free flows may be considered as a special case of the more general problem of controlling the growth of shock waves.

The aerofoils in the RAE(NPL)951-series were designed to exploit these conditions, and also incorporated considerable rear loading. The original section in the series, RAE(NPL)9510, showed great promise[1], but lacked sufficient margin between drag rise and the onset of trailing-edge separation; the aerofoil also had poor high-lift performance at low speeds because of a premature leading edge stall, since a leading-edge shape, designed to produce a good 'peaky' upper-surface pressure distribution at high speed, is also one which will tend to produce very high leading-edge suction peaks at low speeds.

Through an evolutionary process involving a series of minor modifications, RAE(NPL)9510 became RAE(NPL)9515 (see Ref.2) which goes some way towards producing a better trailing-edge separation margin. RAE(NPL)9530, a more drastic modification of RAE(NPL)9515 (see Ref.3) retains this property and has also improved high-lift characteristics at low speeds.

This Report gives the results of wind tunnel tests on RAE(NPL)9515 and 9530. It is shown that these sections display a useful increase in drag-rise Mach number over conventional types of section. Rapid variations in wave drag due to the mode of shock development on these sections, gives rise to peculiar variations in overall drag just prior to the final drag rise. RAE(NPL)9530 displays the higher $C_{L_{max}}$ that was hoped for, although RAE(NPL)9515 still has a slightly better separation margin at high Mach numbers.

This Report begins with an outline of the method by which these aerofoils were designed. Then follows an account of the experimental method, and a brief outline of the test results. The main discussion is subdivided into sections

covering the flow development at high, moderate and low Mach numbers. A final section is included which compares the results obtained, with the limited results available for similar types of aerofoil.

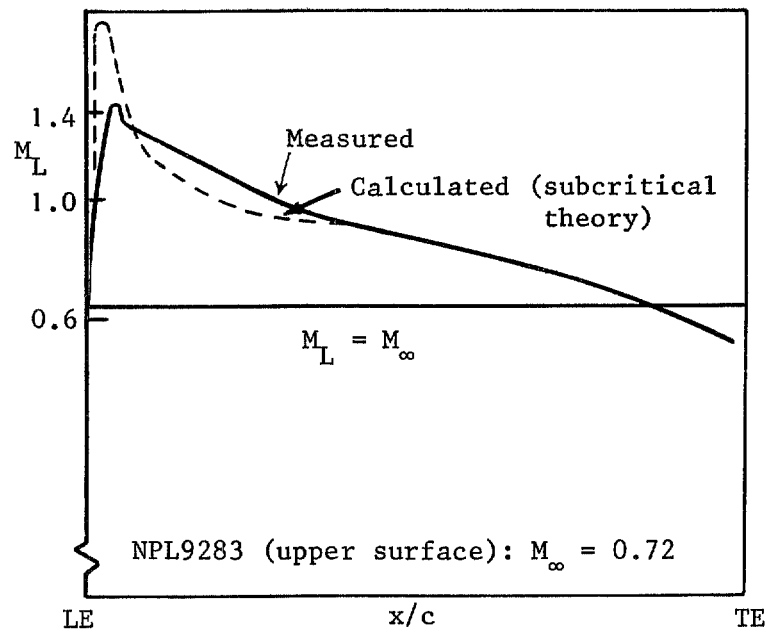
2 DESIGN PRINCIPLES

At the time (1965) when the forerunner of these sections (RAE(NPL)9510) was designed, no rigorous theoretical method was available for the design of section shapes with large regions of supersonic flow embedded in the stream about them. It was necessary, therefore, to use an empirical approach, based on experience and analysis of the geometric shape of 'peaky' aerofoils, but coupled with the use of appropriate, approximate theoretical methods available at that time (e.g. Ref.4) for (strictly) subcritical flows. Thus, the following procedure was adopted. An aerofoil (RAE(NPL)9283) was chosen which had, at a certain free stream Mach number ($M_\infty = 0.72$) and lift coefficient (0.77), a substantial region of shock free flow, involving an isentropic compression from a peak local Mach number of 1.4, near the leading edge, to a rear sonic point near mid-chord (see Ref.5). A fictitious pressure distribution was then calculated for this aerofoil by 'subcritical' theory at the same Mach number and angle of incidence (see sketch (a)). The corresponding distribution of local Mach number over the supercritical region was assumed for the new section at its higher design Mach number (originally chosen as $M_\infty = 0.75$ at a lift coefficient of about 0.6) but the region was stretched to cover the first 70% chord as compared with 40% for the RAE(NPL)9283 (see sketch (b)). Inverse techniques for the approximate theory were then used to define the section shape required to produce the effective design pressure distribution. The resulting aerofoil had a thickness/chord ratio of 11%, and a nose radius of 2% chord. A blunt base of height 0.5% chord was incorporated in order to alleviate the strong adverse pressure gradient over the upper surface of the aerofoil just ahead of the trailing edge, where some additional thickness was added (a fuller account of this design procedure can be found in Ref.1).

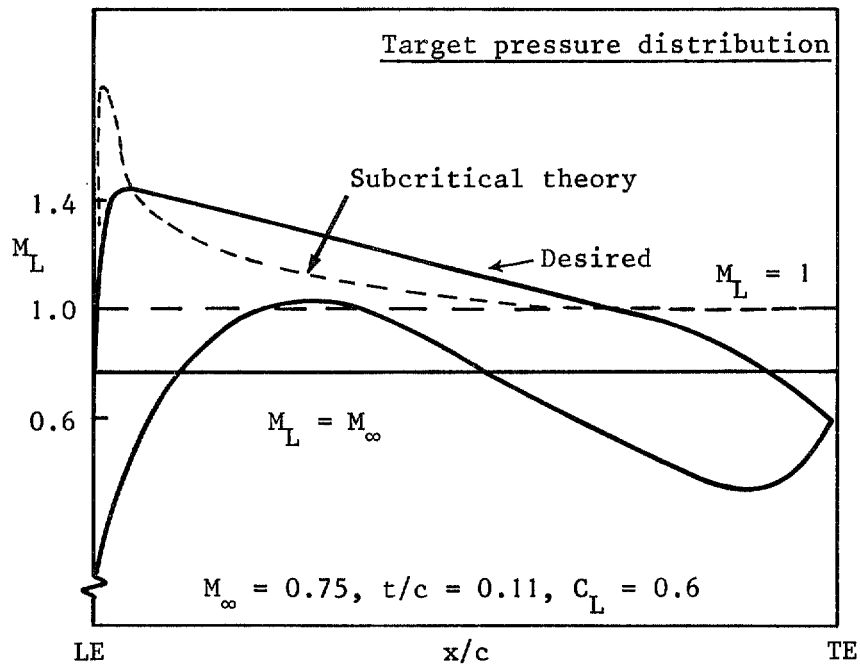
Although the design aims of 9510 were largely met[1], the section exhibited some undesirable characteristics. The two principal faults were

(1) The margin between drag rise and the onset of trailing-edge separation was very small.

(2) A 'creep' in drag occurred up to the rapid drag-rise condition due to the development of shock waves on both upper and lower surfaces.



Sketch (a)



Sketch (b)

A progressive series of simple modifications, which were applied to 9510 in an attempt to alleviate these undesirable faults, resulted in 9515; this section was regarded as the best of a series based on the original section, and it was thought that in order to obtain further improvements, more drastic changes would have to be applied. The following is a list of the changes applied to 9510 in designing 9515, together with some brief reasons for the modifications (see Ref.2):

(a) A reduction in maximum thickness to 10.5% chord by modifying the lower surface near its crest in order to delay the appearance of shocks there. On 9510 these had started to appear at about $M_\infty = 0.75$ at the optimum angles of incidence and were of significant strength at drag rise ($M_\infty = 0.78 - 0.8$).

(b) A slight modification to the section shape at the position of the leading-edge suction peak on the upper surface. This was an attempt to change the overall pressure distribution over the upper surface by altering the leading-edge expansion.

(c) A slight increase in curvature over the low-curvature part of the upper surface. On 9510 the rate of recompression of the supersonic flow on the upper surface was virtually the maximum theoretically possible (for inviscid flow) without shock waves forming, and it was thought preferable to adopt a more conservative profile.

(d) A rearward extension of the low-curvature part of the upper surface from $x/c \doteq 0.65$ to $x/c \doteq 0.85$. This was introduced in order to reduce the primary expansion due to the surface curvature, and thus reduce local Mach numbers ahead of the shock in this region. On 9510 the flow over the upper surface was usually still supersonic at the end of the low curvature region for Mach numbers approaching drag rise. This meant that there was a rapid expansion of the flow around the 'corner' at this point, and thus a stronger terminating shock wave than was desired. Also at higher Mach numbers there was a tendency for the terminating shock to 'stick' at this corner and rapidly increase in strength resulting in a rapid drag rise and little separation margin.

(e) An increase in base thickness from 0.5% chord to 2% chord, to alleviate the adverse pressure gradient on the upper surface near the trailing edge, which would otherwise be accentuated by (d). With this base thickness a Karman vortex sheet would normally form at subsonic speeds; which would

have produced anomalous effects on the results (particularly the drag measurements). A splitter plate was therefore fitted of length equal to the base height and tangential to the chord at the trailing edge, to inhibit vortex shedding.

A basic shortcoming of the aerofoils 9510 and 9515 was poor high-lift performance at low speed because of a leading-edge stall. In an attempt to alleviate this problem a more drastic modification was made; the nose region was enlarged (retaining geometric similarity) and then rejoined to the basic aerofoil so that the upper surface was continuous, the lower surface discontinuity being faired in a fashion which gave an acceptable lower surface pressure distribution. This section is designated RAE(NPL)9530 and its development is described more fully in Ref.3. A comparison between the shapes of 9515 and 9530 is shown in Fig.1, and the ordinates for these sections are given in Tables 1 and 2.

3 EXPERIMENTAL DETAILS

The aerodynamic data for both sections were obtained under identical conditions, with 0.254m chord models spanning the 0.36m dimension of the NPL (now RAE) 36in × 14in (0.92m × 0.36m) transonic wind tunnel. The floor and ceiling of the tunnel were slotted (four slots, overall open-area ratio = 0.033) and were 0.79m apart throughout the length of the working section. Osborne[6] has shown that these conditions give approximately blockage-free results on a NACA0012 section at zero angle of incidence at Mach numbers up to 0.8. For this reason no blockage corrections have been applied to the results, nor have any corrections been applied for lift interference. This should not however be taken to imply that these are not significant; on the contrary, in examples like the present, where large regions of supersonic flow are present on one surface, extending in some cases close to the tunnel walls, it is highly probable that appreciable asymmetric interference effects will be present. It is hoped that some guidance on how to allow quantitatively for these effects will be provided by recent developments in transonic flow theory (e.g. Ref.7); in the meantime the results are presented without correction.

The Reynolds number varies with free stream Mach number (M_∞), since the tunnel always operates with the stagnation pressure approximately atmospheric, the range being from 1.7×10^6 at $M_\infty = 0.3$ to 3.75×10^6 at $M_\infty = 0.85$ based upon model chord. Transition tripping bands of approximately 200 grade carborundum (i.e. particles of the order of 0.08 mm) were used on the models.

On section 9515 the bands were placed from 6% to 8% of chord on the lower surface and from 4% to 6% on the upper surface; on section 9530 the bands were from 6% to 8% on both surfaces. Direct shadow photographs showed that with these bands transition occurred between 0.10 and 0.30 chord downstream of the bands, as shown in Figs.2 and 3.

Pressures were measured at 44 static holes on 9515 and 49 static holes on 9530 which were spread across the central 178 mm of the span of model; lift and pitching moments were estimated from integration of the local pressures. Profile drag was obtained by wake traverse, using a single total head tube, at a distance of one chord length downstream of the trailing edge, which could be traversed through the wake in steps of constant size. In some cases it was necessary to traverse to large vertical distances from the model (of the order of one chord length) in order to detect all the momentum losses through the shocks (see Fig.32).

It has been established by Smith and Moreton[8] that it is possible to make measurements in wind tunnels to an accuracy within 0.1% of full scale using pressure transducers with a specified nonlinearity and hysteresis of 0.5% to 0.75% of full scale. The hysteresis is eliminated by subjecting the transducer to an intermediate (interport) vacuum between the pressures being measured. Thus the pressure is measured relative to a pressure at one extreme of the transducer range. Nonlinearity in the transducer calibration is accounted for in the data-reduction program, using an algebraic relationship between the transducer output and pressure. Brief checks on the transducer calibration were carried out at fixed points from day to day using set reference pressures and minor adjustments to the system were made if required. The accuracy of the measured pressures is therefore of the order of ± 0.0004 in P/H_0.

4 TEST RESULTS

The models were tested over a range of angle of incidence (α) from $\alpha = 1.0^\circ$ to $\alpha = 14^\circ$ for 9515 and $\alpha = -0.82^\circ$ to 13.18° for 9530 with a range of free stream Mach number from $M_\infty = 0.3$ to 0.88 . 9530 was tested at angles of incidence selected such that the upper surfaces of both sections were at the same attitude relative to the free stream; this meant decreasing the angle of incidence by 0.82° when compared with 9515 since this was the change in the angle of the chord line to upper surface brought about by increasing the nose droop.

Tables 3 and 4 contain complete sets of data for 9515 and 9530 respectively for all the conditions of Mach number and angle of incidence tested, but only results relevant to the discussion of the performance of the sections have been plotted. Definitions of the quantities given in these tables are shown in the list of symbols.

The variations of lift coefficient with angle of incidence and Mach number for the two sections are shown in the 'carpet' plots of Figs.4 and 5. It can be seen that both sections have very similar lift characteristics, except that at low speeds ($M_\infty = 0.3$), 9530 shows a 22% gain in $C_{L_{max}}$ over 9515. At Mach numbers between 0.4 and 0.6 both sections display a gentle stall rather than a sudden loss of lift; for Mach numbers greater than 0.7 9515 displays a well defined lift-break, whereas 9530 still has a milder one at most Mach numbers. Figs.6 and 7 compare the variation of lift coefficient with Mach number at constant angles of incidence. For both sections the lift coefficient increases steadily with increasing free stream Mach number to a maximum around the Mach number at which rapid drag rise occurs.

Figs.8 and 9 show the variation of drag coefficient with Mach numbers. At low angles of incidence the curves are of the usual shape with a pronounced drag 'creep' between $M_\infty \triangleq 0.75$ and the subsequent rapid drag rise at $M_\infty \triangleq 0.80$. At slightly higher angles of incidence a similar drag creep is followed by a rapid reduction of C_D by as much as 0.003 at free stream Mach numbers near 0.79, prior to the eventual rapid drag rise ($M_\infty > 0.80$). The values of C_D at the bottom of this drag 'bucket' appear to be consistent with an almost complete absence of wave drag.

From Figs.4 to 9, Fig.10 has been constructed which compares the drag rise and separation boundaries of the two sections. It can be seen that there is little to choose between the sections in terms of drag rise (which is taken as the rapid rise following the drag 'bucket'). The separation boundaries are here defined as the locus of points representing $C_{L_{max}}$ at constant angle of incidences for Mach numbers greater than 0.7, and points taken from the break in the lift curve slope for Mach numbers less than 0.7 (for $M_\infty > 0.7$ these two definitions would be in reasonable agreement - see Figs.4 and 5). In terms of separation onset it can be seen that there is little difference between the aerofoils at the higher lift coefficients ($C_L > 0.5$), but for C_L below 0.5, 9515 has a slightly better separation margin, of the order of 0.01 in Mach number.

At Mach numbers between 0.3 and 0.6 9530 shows to advantage its modified leading edge shape, which has helped to alleviate the leading edge separation effects. For Mach numbers between 0.6 and 0.7 the leading edge separation gives way suddenly to a shock-induced separation; this accounts for the sudden jump in C_L to be seen in Figs.6 and 7 ($\alpha = 7.0^o$ and 7.18^o respectively, see later). Near $M_\infty = 0.70$ a remarkably high lift coefficient, at least 1.2, is obtained before appreciable separation occurs.

The pitching moment variations for the two sections with C_L and M are shown in Figs.11 and 12 and illustrate an effect characteristic of the development of the supercritical flow on the upper surface. This is the increase in nose-down pitching moment that is experienced as the region of supersonic flow spreads downstream of the quarter chord point (the pitching axis), as Mach number increases. As the supersonic region is terminated by a shock wave, the development of this region is indicated by the movement of the principal upper surface shock, shown in Figs.13 and 14, and variations of pitching moment can conveniently be discussed in terms of movement of this shock. As the shock does not reach positions beyond 50% chord until high Mach numbers are reached (i.e. $M_\infty > 0.725$) C_M varies very little with C_L for Mach numbers below this value. Fig.15 shows that at constant C_L the pitching moment is almost constant until the shock begins to move rapidly; this sudden rapid movement in shock position, which is shown in Figs.17 and 18, causes a rapid increase in nose down pitching moment. Fig.16 shows the effect this has on the centre of pressure position; again it is almost fixed until the shock begins to move rapidly, whence the centre of pressure moves rapidly back about 10% of chord.

Typical pressure distributions are shown in Figs.19 to 28 for both aerofoils at approximately the same values of lift coefficient. The significance of these comparisons is discussed in the following sections.

5 GENERAL DISCUSSION

In this section the development of the flow over the aerofoils is examined in detail for the full range of free stream Mach number and angle of incidence, particularly in respect of those aspects which are relevant to the more interesting or unusual features of the aerofoil performance mentioned in the previous section. It is convenient to separate the flow development into three Mach number ranges: high, moderate and low, for ease of discussion.

5.1 Flow development at high speed

At Mach numbers greater than 0.7 the aerofoils demonstrate their ability to sustain supersonic flow over a large portion of the upper surface, up to 70% of chord at some conditions, the supersonic region being terminated by a weak shock that almost completely disappears at a certain 'optimum' combination of Mach number and angle of incidence. There are also some very rapid variations in drag just prior to rapid drag rise associated with the shock development.

Figs.19 and 20 show the development with increasing free stream Mach number of the pressure distributions over the two sections at the optimum angle of incidence (optimum only in the sense that nearly shock-free flow is obtained at an appropriate Mach number). Once the critical free stream Mach number is passed, at about $M_\infty = 0.5$ the leading-edge suction peak on the upper surface grows quickly until a free stream Mach number of about 0.65 is reached, when the peak height 'freezes' with the local Mach number at about 1.4 in the case of 9515 and 1.25 for 9530. The suction peak is followed by a shock wave which has become quite strong at $M_\infty = 0.75$ (the local Mach number ahead of the shock being 1.2). The upper-surface shock wave moves rapidly rearwards as the free stream Mach number is increased further, allowing progressively more of the recompression to be achieved isentropically following the leading edge peak. At a free stream Mach number of about 0.80 the recompression becomes sufficient for the shock to break up into a series of weak shocks, and at this condition these aerofoils can be claimed to be almost shockless. Following this optimum condition the shock reappears further back along the chord and rapidly increases in strength, giving rise to trailing-edge separation. The lower surface pressure distributions at these Mach numbers show the large amount of lift carried over the rear 50% of the aerofoils because of the high pressures on the lower surface. It can be seen that the effect of increasing free stream Mach number is to increase the local Mach number over the whole lower surface by a similar amount; this gives rise, in the case of 9515 to the appearance of a shock at the lower surface 'crest' just prior to the 'optimum' free stream Mach number, the strength of which is sufficient to add appreciably to the overall drag. 9530 however does not have a lower surface shock at the corresponding condition because of its modified leading-edge shape, as a result of which the lower-surface flow has only just become critical at the optimum Mach number.

Figs.21 to 26 show the pressure distributions over the aerofoils at angles of incidence higher than the optimum. It can be seen that the effect of

increasing the angle of incidence is to increase progressively the 'peak' height, and thus the aerofoils can no longer recompress the supersonic flow to subsonic flow by an isentropic compression as was possible at the 'optimum' angle of incidence. It can be seen in Figs.21 to 26 that the supersonic portions of the flow form an envelope and this was found to correspond closely to the 'sonic' pressure distribution as calculated by the method of Ref.9, as can be seen in Figs.21 and 24. For all these pressure distributions the upper-surface shock wave moves very rapidly with increasing free stream Mach number.

In Fig.19 at a free stream Mach number of 0.79 there is a shock at around 30% chord followed by a re-expansion of the flow, with a tendency for a second weak shock to form at around 60% chord. However, at a free stream Mach number of 0.8, the flow recompresses, following the leading edge 'peak', back to around 50% chord, then re-expands slightly and develops a weak shock at about 70% chord. With a further increase in Mach number of 0.01 to a value of 0.81 the flow recompresses only slightly following the leading edge 'peak' and forms a strong shock at 80% chord. The rapid movement of the shock is associated with the very low curvature of the upper surface of these aerofoils. It is interesting to note (Fig.21) that the pressure rise at the shock reaches a pronounced minimum of about the Mach number (0.79) on 9515 corresponding to the drag minimum (the so called drag 'bucket') whereas, this effect is less noticeable on 9530. It can be seen that for both sections at high angles of incidence (Figs.23 to 26) the shock movement becomes restricted by the rear separation spreading forwards. This 'sticking' of the shock was also shown in Figs.13 and 14. There is no tendency for the shock to move forward as is usually the case at high Mach numbers. It is thought, however, that since the shock is in a position near the trailing edge, and the chordwise extent of the rear separation is so small, the onset of buffeting should be mild. Tentative evidence in support of this has been put forward by Peake and Yoshihara[10], who found on an aerofoil of similar type that, despite trailing-edge pressure divergence, there was no appreciable increase in fluctuation in normal force until $C_{L_{max}}$ was approached, and the separated flow over the section became extensive.

Figs.27 and 28 show that upper-surface pressure distributions at the highest Mach number tested conform very closely to the calculated sonic-range pressure distribution, mentioned previously, in all but shock position.

Fig.29 compares the pressure distributions for the two sections at what may be called their 'design' condition, that is where the flow on the upper

surface recompresses almost isentropically; any shock waves that are present being very weak. It can be seen that the modified nose of 9530 has reduced the high speed leading-edge peak and brought about a somewhat flatter upper-surface pressure distribution. Much of the loss of lift from the lower leading-edge peak has been recovered by the modified lower-surface pressure distribution, where extra load is carried aft of $x/c = 0.1$ compared with 9515. This is a beneficial (though accidental) result of the fairing of the nose modification. Whereas 9515 has a pressure distribution on the lower surface which is definitely supercritical and is terminated by a weak shock, 9530 has a flatter distribution which is only just critical.

Fig.30 compares the pressure distributions on the two sections at an angle of incidence higher by $\frac{1}{2}^{\circ}$, when both aerofoils are close to the drag rise condition. It can be seen that whilst the lift coefficient is nearly the same on both aerofoils and the upper surface shocks are in identical positions the shock on 9530 is marginally the stronger; so that a slight deterioration in high speed performance compared with 9515 can be expected. This is borne out by the corresponding drag measurements shown in Figs.8 and 9 where at $M_{\infty} = 0.8$ 9515 is at the bottom of the drag 'bucket' at $\alpha = 1.75^{\circ}$ whereas 9530 at $\alpha = 1.43^{\circ}$ is on the rapid drag rise.

An interesting feature of 9530 is that its pressure distribution conforms very closely to that of some sections developed by Whitcomb and others in the USA[11]; that is, it has, over the range of Mach number between 0.75 and 0.80 and lift coefficients between 0.4 and 0.5, a nearly flat upper-surface pressure distribution with a local Mach number of approximately 1.2 extending at the higher free stream Mach numbers back to 70% chord. Furthermore, the similarities between the geometric shape of 9530 and the available illustrations of 'Whitcomb' type aerofoils[12,13] are very noticeable.

Figs.8 and 9 show that the characteristic of a drag 'creep' followed by a 'bucket' is still present on both these sections, as on 9510 (see Ref.1). We now examine the conditions which lead to these marked variations in drag just prior to the final drag rise, taking as examples the cases of 9515 at $\alpha = 2^{\circ}$, and 9530 at $\alpha = 1.68^{\circ}$. As can be seen in Fig.31 9515 shows very large fluctuations in drag in the vicinity of the drag-rise condition, as also does 9530 (though to a somewhat lesser degree) at roughly the same lift coefficient. Fig.21 showed the development of the upper surface pressure distribution with free stream Mach number; it can be seen that between $M_{\infty} = 0.725$ and 0.775 the

Mach number ahead of the shock remains approximately constant, but between $M_\infty = 0.78$ and 0.79 it reduces appreciably before increasing again for $M_\infty > 0.80$. During this development the shock extends steadily away from the surface, as can been seen from the schlieren photographs in Fig.32. The schlieren photographs for 9530 at a similar lift coefficient are shown in Fig.33. From these photographs it is not possible to deduce directly how the wave drag will vary. Further insight into the process can be gained by looking at the variation of total head in the wake, from which the drag is calculated. Fig.34 shows some of these wake traverses, together with the variation of C_D with M_∞ (insert (a)) and of local Mach number just ahead of the shock wave (M_u) with M_∞ (insert (b)). Two estimates of the Mach number upstream of the shock are given; (i) directly from the surface pressure measurements of Fig.21 and (ii) by using the calculated loss of total head through a normal shock and, assuming that the total head in the wake just outside the viscous core is the same as the total head just downstream of the shock. It can be seen that the Mach numbers predicted by these two methods are in reasonably good agreement and also follow qualitatively the variation of C_D. From the wake traverses it is clear that the shock strength at the surface decreases significantly between conditions 1 and 2 and initially dies away rapidly, at condition 2, away from the wake centre-line; there is a slight increase in strength, however, further out into the free stream, giving rise to a momentum deficit which must be added into the total drag. At condition 3, although the shock strength at the surface is slightly greater than at condition 2, it also dies away rapidly but in this case does not increase again. As a result the values of drag at conditions 2 and 3 are similar. At condition 4 the shock strength at the surface has built up significantly and takes a greater distance to die away. This condition corresponds to the onset of the final rapid drag rise. The corresponding schlieren photographs (labelled 1 to 4 in Fig.32) generally confirm these observations, although at $M_\infty = 0.79$ (case 3) the shock strength does not appear to decrease so rapidly away from the surface as would have been expected from the wake traverse measurements of Fig.34. This is perhaps an indication of spanwise variations in shock strength and thus may indicate an uncertainty in the drag deduced from a traverse at one spanwise position only.

To conclude this section, we now consider the overall variation of drag coefficient with lift coefficient and Mach number (in particular, the premature 'drag creep') in order to see if this presents any serious problems from a practical point of view.

It is convenient to look at the variation of C_D with M_∞ at fixed values of C_L (obtained by interpolation from the values of C_D measured at constant angle of incidence) between 0.4 and 0.6. These are shown in Figs.35 and 36. Presented in this way, the 'hump' in the drag curves appears to be lower and less steep than when the curves are plotted at constant angle of incidence (compare the drag curves in Fig.31 with the curves for $C_L = 0.5$ in Figs.35 and 36); however, the reduction in drag to a minimum, between $M_\infty = 0.785$ and 0.795, appears accentuated, particularly at lift coefficients above 0.5.

To obtain a quantitative picture of the wave drag, i.e. the drag increment due to the presence of shock waves, Figs.37 and 38 have been plotted. They show contours in the C_L, M_∞ plane of ΔC_D, the increase in C_D above its value at $M_\infty = 0.5$ at the same value of C_L. (Since the flow at $M_\infty = 0.5$ will be largely subcritical for $C_L < 0.6$, and, in the absence of shock waves, profile drag will vary very little with M_∞ at constant C_L, these contours should represent closely the values of wave drag.) The most interesting feature of Figs.37 and 38 is the trough in wave drag near $M_\infty = 0.79$ which extends from $C_L = 0.4$ to 0.6, and covers a band in Mach number about 0.01 wide, for which the wave drag coefficients (ΔC_D) is less than 0.001. This trough, approached in the direction of increasing Mach number, is preceded by a ridge (the drag creep already mentioned) of increasing height and steepness as C_L is increased. However, the height of this ridge does not exceed $\Delta C_D = 0.002$ (a criteria commonly used for identifying the 'drag rise' condition) for lift coefficients below about 0.55, which is probably the maximum useful operating lift coefficient of these aerofoils at high Mach number for other reasons (the buffet boundary shown in Fig.10). Thus, although the premature drag creep is undesirable, and should be eliminated if possible, it may not be too serious in a practical application.

5.2 Flow development at moderate Mach numbers ($M_\infty = 0.6$ and 0.7) under high lift conditions

Near $M_\infty = 0.70$ a remarkably high lift coefficient, at least 1.2, is obtained before appreciable separation occurs; in contrast if the Mach number is reduced slightly the high-lift performance deteriorates rapidly, giving a usable C_L of only 0.9 between $M_\infty = 0.5$ and 0.6. The reasons for this behaviour are analysed in this section.

Figs.39 and 40 show the upper surface pressure distributions for the two aerofoils at a free stream Mach number of 0.7, at angles of incidence between

3 and 7^{o}. A large chordwise extent of supersonic flow is present at the higher angles of incidence, terminated by a shock wave which first produces a small separation bubble at its foot at $\alpha = 5^{o}$ and 4.18^{o}, the flow reattaching before it reaches the trailing edge. (The blunt base is helpful in mitigating trailing-edge separation by increasing the trailing-edge velocity, to the extent that the pressure there is below free stream static.) As the angle of incidence is increased, the local Mach number over the forward part of both aerofoils increases steadily and uniformly (almost independently of x/c), and the shock wave, terminating the supersonic region, moves rearwards and increases in strength until eventually a stage is reached when the strength of the shock is sufficient to create a separation spreading from the foot of the shock to the trailing edge. When this occurs, at about $\alpha = 7^{o}$, the supersonic region has a maximum local Mach number of 1.65, decelerating to 1.5 just ahead of the shock at $x/c = 0.45$; and it is this feature which leads to the high lift coefficient, the supersonic region alone contributing more than 0.5 to C_L. At this stage, which would be expected to correspond to the onset of appreciable* buffeting, the lift coefficient has reached the high value of 1.2 for both aerofoils.

Figs.41 and 42 show the upper surface pressure distributions for a free stream Mach number of 0.6 and varying angles of incidence. The flows are entirely different in character from those at $M_\infty = 0.7$ (Figs.39 and 40) being dominated by leading-edge separation bubbles leading to the collapse of the leading-edge peak. The separation leading to the bubbles is probably laminar, since it is unlikely that transition will have occurred by the beginning of the bubble. At these angles of incidence and Mach number both sections behave in a similar manner, although 9530 achieves a higher suction before the flow breaks down. There is a change in character of the flow between $M_\infty = 0.6$ and $M_\infty = 0.7$. As the Mach number increases beyond 0.65 the supersonic flow region expands and develops a favourable influence on lift because of the high suctions in the supercritical region, whereas for $M < 0.65$ the supersonic region is of limited chordwise extent, and the separation of the laminar boundary layer near the nose by the terminating shock wave results in adverse effects on lift.

5.3 Flow development at low speed under high lift conditions

It is at low speeds that 9530 shows its ability to achieve a higher value of lift coefficient, before the upper surface flow breaks down, compared with 9515; this is entirely due to the modified nose shape.

---

* Local oscillations in pressure may however be expected under the separation bubble caused by the shock, before the separation has spread to the trailing edge.

Figs.43 and 44 compare the upper surface pressure distributions on the two sections at a free stream Mach number of 0.3. They show that, although both sections have a similar limiting value of peak C_P just prior to separation, the occurrence of the peak is delayed to a higher angle of incidence on 9530 and thus a higher $C_{L_{max}}$ is achieved (1.2 compared with 1.0 for 9515). From Fig.41 it can be seen that on 9515, once the leading-edge peak has collapsed, an extensive separation bubble forms, which appears to increase the suction on the upper surface between say 15% and 50% chord, so that the aerofoil continues to generate a substantial lift coefficient. However this lift may be of little use in practice since there will be considerable buffeting associated with the bubble. Fig.44 shows that on 9530 a separation bubble forms and almost immediately spreads to the trailing edge (there is some evidence of a bubble forming at $\alpha = 10.18^{o}$ around $x/c = 0.25$) and thus there is a rapid loss of lift following $C_{L_{max}}$ as shown in Fig.48. Figs.45 and 46 show that for values of C_L for which the flow is fully attached the only differences between the pressure distributions are the lower peak height on 9530 and the modified lower surface pressure distribution.

Fig.47 shows the variation in peak C_P with C_L ; this figure confirms that for a fixed C_L 9515 generates a higher leading edge peak; or conversely for a fixed peak C_P 9530 gives a useful increase in C_L over 9515. The increase is not quite as much as is indicated by the method of Ref.14; this is partly because of viscous effects and partly because the experimental results at a free stream Mach number of 0.3 show some effects of compressibility.

6 COMPARISONS WITH OTHER RESULTS

It is relevant to compare the performance of the aerofoils with the few published results currently available for other similar aerofoils.

Fig.49 shows the drag divergence characteristics of a recent Boeing supercritical aerofoil (from Ref.15) and also of NAE shockless lifting aerofoil No.1 (Ref.17) compared with the results for 9515. It shows that 9515 is slightly better than the Boeing aerofoil at lift coefficients near 0.6, while the former aerofoil is also slightly thicker (10½% compared with 10%). The NAE aerofoil is thicker than the Boeing aerofoil or 9515, being 11½% thick, yet its drag rise critical Mach number is only 3% less than that of 9515 and the Boeing aerofoil over most of the C_L range. It may therefore be concluded that the results for 9515 and 9530 compare favourably with results for similar aerofoils designed elsewhere.

A relevant comparison with a theoretical design can be found in one of a series of aerofoils calculated by the method of Bauer, Garabedian and Korn[16], shown in Fig.50. The section has a similar overall shape and the same thickness as those described here; also the design Mach number (0.79) and lift coefficient (0.67) are similar, noting that the lift coefficient for the latter will be reduced by viscous effects. The aerofoils of Garabedian, *et al.* are intended to be shock free at the design condition, but on the basis of experimental evidence[17] with another aerofoil designed by this method it may be inferred that the drag rise Mach number is practically the same as the design Mach number.

It may be concluded that the performance of these RAE aerofoils at high speeds is comparable with that attained elsewhere. It is probable that if any further substantial improvement in performance is to be obtained test facilities operating at higher Reynolds numbers will be necessary.

7 CONCLUSIONS

The results described indicate that these aerofoil sections show a considerable improvement in drag rise Mach number over conventional types and at a low drag level. Both sections exhibit rapid variations in drag just prior to the final drag rise, which can be ascribed to corresponding variations in wave drag, due to changes in the strength and lateral extent of the shock wave that terminates the supersonic flow on the upper surface. (However, there is no reason to suppose that these rapid variations are inevitable characteristics of sections of this sort.)

9515 has slightly better separation margins at high Mach numbers and moderate lift coefficients, whereas at Mach numbers between 0.3 and 0.6, 9530 has better high lift characteristics.

At Mach numbers near 0.7 a very high lift coefficient is obtained, over 1.2, before serious effects of boundary layer separation are observed.

At the optimum conditions ($M_\infty = 0.8$, $C_L \triangleq 0.5$) both sections exhibit a very nearly shock-free recompression, of which that on 9530 appears to be nearly isentropic.

Table 1

RAE(NPL)9515 ORDINATES

x/c	(y/c) upper	(y/c) lower	x/c	(y/c) upper	(y/c) lower	x/c	(y/c) upper	(y/c) lower
0	0	0	0.014	0.01867	-0.02129	0.38	0.04930	-0.05709
0.0002	0.00256	-0.00284	0.0145	0.01888	-0.02161	0.40	0.04970	-0.05592
0.0004	0.00361	-0.00399	0.015	0.01909	-0.02192	0.42	0.05002	-0.05452
0.0006	0.00442	-0.00487	0.0155	0.01929	-0.02222	0.44	0.05026	-0.05291
0.0008	0.00510	-0.00560	0.016	0.01948	-0.02252	0.46	0.05042	-0.05103
0.001	0.00570	-0.00624	0.0165	0.01967	-0.02281	0.48	0.05050	-0.04891
0.0012	0.00624	-0.00682	0.017	0.01985	-0.02310	0.50	0.05049	-0.04650
0.0014	0.00674	-0.00734	0.0175	0.02003	-0.02338	0.52	0.05041	-0.04373
0.0016	0.00721	-0.00783	0.018	0.02020	-0.02366	0.54	0.05024	-0.04069
0.0018	0.00764	-0.00828	0.0185	0.02037	-0.02394	0.56	0.04999	-0.03730
0.002	0.00805	-0.00871	0.019	0.02058	-0.02421	0.58	0.04965	-0.03384
0.0025	0.00900	-0.00969	0.0195	0.02068	-0.02448	0.60	0.04923	-0.03032
0.003	0.00987	-0.01057	0.02	0.02083	-0.02475	0.62	0.04873	-0.02693
0.0035	0.01068	-0.01137	0.03	0.02343	-0.02964	0.64	0.04815	-0.02357
0.004	0.01142	-0.01211	0.04	0.02550	-0.03374	0.66	0.04748	-0.02015
0.0045	0.01209	-0.01280	0.05	0.02723	-0.03732	0.68	0.04673	-0.01674
0.005	0.01270	-0.01344	0.06	0.02870	-0.04039	0.70	0.04590	-0.01351
0.0055	0.01324	-0.01405	0.07	0.03009	-0.04299	0.72	0.04498	-0.01047
0.006	0.01374	-0.01463	0.08	0.03138	-0.04524	0.74	0.04397	-0.00756
0.0065	0.01421	-0.01518	0.09	0.03257	-0.04714	0.76	0.04288	-0.00471
0.007	0.01463	-0.01570	0.10	0.03368	-0.04874	0.78	0.04171	-0.00214
0.0075	0.01503	-0.01621	0.12	0.03567	-0.05144	0.80	0.04046	0.00007
0.008	0.01541	-0.01669	0.14	0.03745	-0.05367	0.82	0.03910	0.00191
0.0085	0.01576	-0.01715	0.16	0.03907	-0.05546	0.84	0.03764	0.00334
0.009	0.01609	-0.01760	0.18	0.04054	-0.05688	0.86	0.03604	0.00438
0.0095	0.01640	-0.01803	0.20	0.04187	-0.05795	0.88	0.03426	0.00504
0.010	0.01670	-0.01844	0.22	0.04309	-0.05873	0.90	0.03225	0.00532
0.0105	0.01698	-0.01884	0.24	0.04420	-0.05927	0.92	0.03002	0.00519
0.011	0.01725	-0.01922	0.26	0.04519	-0.05958	0.94	0.02756	0.00460
0.0115	0.01751	-0.01959	0.28	0.04609	-0.05970	0.96	0.02486	0.00341
0.012	0.01775	-0.01995	0.30	0.04690	-0.05961	0.98	0.02194	0.00180
0.0125	0.01799	-0.02030	0.32	0.04762	-0.05930	1.00	0.01879	0.0
0.13	0.01823	-0.02064	0.34	0.04826	-0.05878			
0.0135	0.01845	-0.02097	0.36	0.04883	-0.05804			

Table 2

RAE(NPL)9530 ORDINATES

x/c	(y/c) upper	(y/c) lower	x/c	(y/c) upper	(y/c) lower	x/c	(y/c) upper	(y/c) lower
0	0	0	0.20	0.04887	-0.04613	0.61	0.04800	-0.02960
0.00005	0.00166	-0.00166	0.21	0.04933	-0.04668	0.62	0.04753	-0.02810
0.0002	0.00332	-0.00332	0.22	0.04977	-0.04719	0.63	0.04704	-0.02661
0.0005	0.00523	-0.00523	0.23	0.05017	-0.04767	0.64	0.04652	-0.02512
0.001	0.00736	-0.00736	0.24	0.05054	-0.04811	0.65	0.04599	-0.02363
0.0015	0.00898	-0.00898	0.25	0.05088	-0.04852	0.66	0.04543	-0.02215
0.002	0.01032	-0.01032	0.26	0.05118	-0.04889	0.67	0.04485	-0.02068
0.0025	0.01148	-0.01148	0.27	0.05147	-0.04922	0.68	0.04425	-0.01923
0.003	0.01251	-0.01251	0.28	0.05172	-0.04952	0.69	0.04363	-0.01780
0.0035	0.01345	-	0.29	0.05195	-0.04979	0.70	0.04298	-0.01640
0.004	0.01431	-0.01409	0.30	0.05215	-0.05002	0.71	0.04232	-0.01503
0.005	0.01584	-0.01516	0.31	0.05234	-0.05021	0.72	0.04163	-0.01370
0.006	0.01718	-0.01603	0.32	0.05250	-0.05036	0.73	0.04092	-0.01240
0.007	0.01837	-0.01679	0.33	0.05263	-0.05047	0.74	0.04019	-0.01115
0.008	0.01943	-0.01748	0.34	0.05275	-0.05054	0.75	0.03943	-0.00995
0.009	0.02039	-0.01812	0.35	0.05285	-0.05056	0.76	0.03866	-0.00880
0.010	0.02126	-0.01872	0.36	0.05292	-0.05053	0.77	0.03786	-0.00772
0.011	0.02205	-0.01929	0.37	0.05298	-0.05046	0.78	0.03705	-0.00670
0.012	0.02277	-0.01983	0.38	0.05301	-0.05033	0.79	0.03621	-0.00576
0.013	0.02342	-0.02034	0.39	0.05302	-0.05015	0.80	0.03534	-0.00490
0.015	0.02457	-0.02130	0.40	0.05301	-0.04991	0.81	0.03445	-0.00412
0.020	0.02694	-0.02328	0.41	0.05298	-0.04962	0.82	0.03354	-0.00344
0.025	0.02883	-0.02492	0.42	0.05293	-0.04926	0.83	0.03260	-0.00285
0.030	0.03035	-0.02632	0.43	0.05286	-0.04885	0.84	0.03163	-0.00236
0.035	0.03165	-0.02757	0.44	0.05277	-0.04838	0.85	0.03063	-0.00197
0.040	0.03281	-0.02870	0.45	0.05265	-0.04784	0.86	0.02959	-0.00167
0.05	0.03484	-0.03074	0.46	0.05252	-0.04722	0.87	0.02851	-0.00148
0.06	0.03656	-0.03251	0.47	0.05237	-0.04654	0.88	0.02737	-0.00140
0.07	0.03804	-0.03406	0.48	0.05220	-0.04578	0.89	0.02618	-0.00142
0.08	0.03937	-0.03546	0.49	0.05200	-0.04494	0.90	0.02493	-0.00155
0.09	0.04058	-0.03675	0.50	0.05179	-0.04402	0.91	0.02363	-0.00178
0.10	0.04170	-0.03795	0.51	0.05155	-0.04301	0.92	0.02226	-0.00213
0.11	0.04272	-0.03906	0.52	0.05129	-0.04193	0.93	0.02083	-0.00260
0.12	0.04365	-0.04008	0.53	0.05101	-0.04077	0.94	0.01934	-0.00318
0.13	0.04449	-0.04104	0.54	0.05071	-0.03954	0.95	0.01779	-0.00387
0.14	0.04525	-0.04192	0.55	0.05039	-0.03823	0.96	0.01618	-0.00469
0.15	0.04596	-0.04274	0.56	0.05004	-0.03687	0.97	0.01451	-0.00561
0.16	0.04662	-0.04351	0.57	0.04968	-0.03547	0.98	0.01278	-0.00667
0.17	0.04724	-0.04423	0.58	0.04929	-0.03403	0.99	0.01099	-0.00784
0.18	0.04782	-0.04490	0.59	0.04888	-0.03257	1.00	0.00914	-0.00914
0.19	0.04836	-0.04553	0.60	0.04845	-0.03109			

Table 3

PRESSURE COEFFICIENTS FOR RAE(NPL)9515

$M = 0.3$

α	1.0	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0
C_L	0.227	0.279	0.310	0.337	0.397	0.449	0.503	0.563	0.617	0.678
C_M	-0.070	-0.070	-0.071	-0.071	-0.072	-0.073	-0.074	-0.074	-0.074	-0.074

C_p

x/c										
Upper surface										
0.000	0.891	0.809	0.761	0.704	0.579	0.436	0.271	0.080	-0.125	-0.352
0.005	-0.712	-0.957	-1.095	-1.229	-1.520	-1.820	-2.148	-2.497	-2.860	-3.238
0.010	-0.887	-1.101	-1.224	-1.351	-1.609	-1.879	-2.183	-2.513	-2.857	-3.221
0.015	-1.060	-1.246	-1.359	-1.468	-1.706	-1.950	-2.224	-2.521	-2.806	-3.122
0.020	-0.972	-1.121	-1.221	-1.308	-1.515	-1.719	-1.978	-2.283	-2.569	-2.903
0.030	-0.768	-0.903	-0.997	-1.084	-1.293	-1.221	-1.200	-1.393	-1.573	-1.771
0.050	-0.587	-0.624	-0.690	-0.738	-0.857	-0.950	-1.058	-1.182	-1.281	-1.394
0.075	-0.466	-0.523	-0.572	-0.607	-0.686	-0.760	-0.840	-0.932	-1.007	-1.094
0.100	-0.426	-0.469	-0.509	-0.540	-0.604	-0.669	-0.738	-0.810	-0.873	-0.945
0.150	-0.372	-0.404	-0.442	-0.463	-0.512	-0.563	-0.611	-0.666	-0.716	-0.770
0.200	-0.363	-0.387	-0.421	-0.441	-0.478	-0.521	-0.562	-0.609	-0.647	-0.694
0.260	-0.354	-0.375	-0.400	-0.421	-0.449	-0.485	-0.515	-0.568	-0.594	-0.626
0.320	-0.344	-0.357	-0.381	-0.399	-0.422	-0.453	-0.478	-0.523	-0.547	-0.568
0.380	-0.319	-0.333	-0.356	-0.371	-0.388	-0.417	-0.440	-0.477	-0.500	-0.526
0.440	-0.323	-0.335	-0.353	-0.367	-0.386	-0.410	-0.426	-0.458	-0.476	-0.498
0.500	-0.300	-0.312	-0.330	-0.344	0.360	-0.375	-0.395	-0.423	-0.432	-0.458
0.560	-0.291	-0.296	-0.312	-0.329	-0.346	-0.357	-0.372	-0.397	-0.410	-0.427
0.620	-0.281	-0.287	-0.303	-0.315	-0.332	-0.340	-0.355	-0.376	-0.382	-0.404
0.680	-0.262	-0.263	-0.277	-0.285	-0.302	-0.308	-0.320	-0.334	-0.349	-0.361
0.740	-0.236	-0.239	-0.245	-0.255	-0.270	-0.279	-0.285	-0.302	-0.310	-0.314
0.800	-0.229	-0.228	-0.238	-0.245	-0.256	-0.263	-0.268	-0.281	-0.287	-0.289
0.850	-0.234	-0.230	-0.240	-0.246	-0.251	-0.260	-0.263	-0.271	-0.272	-0.277
0.900	-0.236	-0.226	-0.238	-0.239	-0.244	-0.247	-0.250	-0.257	-0.253	-0.254
0.950	-0.150	-0.141	-0.154	-0.152	-0.153	-0.158	-0.158	-0.166	-0.158	-0.162
0.980	-0.122	-0.113	-0.121	-0.119	-0.120	-0.120	-0.118	-0.127	-0.118	-0.122
1.000	-0.076	-0.068	-0.073	-0.071	-0.073	-0.073	-0.073	-0.082	-0.069	-0.075
Lower surface										
0.000	0.891	0.809	0.761	0.704	0.579	0.436	0.271	0.080	-0.125	-0.352
0.005	0.708	0.793	0.828	0.861	0.920	0.964	0.996	1.019	1.022	1.022
0.010	0.397	0.510	0.555	0.603	0.691	0.768	0.834	0.894	0.938	0.977
0.020	0.190	0.295	0.335	0.378	0.463	0.545	0.617	0.682	0.742	0.798
0.050	-0.188	-0.096	-0.063	-0.024	0.057	0.129	0.203	0.268	0.337	0.401
0.100	-0.323	-0.251	-0.230	-0.201	-0.136	-0.078	-0.019	0.029	0.085	0.137
0.150	-0.330	-0.270	-0.254	-0.238	-0.183	-0.137	-0.087	-0.045	0.000	0.048
0.200	-0.344	-0.291	-0.274	-0.259	-0.213	-0.176	-0.132	-0.099	-0.059	-0.017
0.280	-0.318	-0.275	-0.205	-0.253	-0.218	-0.186	-0.149	-0.124	-0.094	-0.055
0.360	-0.314	-0.274	-0.272	-0.260	-0.232	-0.205	-0.175	-0.161	-0.130	-0.106
0.440	-0.286	-0.254	-0.251	-0.241	-0.220	-0.197	-0.170	-0.154	-0.130	-0.104
0.520	-0.206	-0.179	-0.177	-0.169	-0.152	-0.132	-0.111	-0.105	-0.089	-0.066
0.600	-0.040	-0.020	-0.017	-0.015	-0.001	0.015	0.029	0.035	0.050	0.069
0.680	0.068	0.087	0.087	0.091	0.103	0.113	0.123	0.127	0.141	0.155
0.740	0.139	0.155	0.154	0.155	0.167	0.178	0.186	0.194	0.204	0.216
0.800	0.201	0.211	0.216	0.213	0.223	0.230	0.240	0.243	0.256	0.268
0.850	0.213	0.225	0.225	0.224	0.236	0.242	0.247	0.250	0.260	0.270
0.900	0.209	0.223	0.219	0.219	0.227	0.234	0.238	0.243	0.249	0.254
0.950	0.155	0.169	0.165	0.164	0.173	0.176	0.179	0.182	0.185	0.192
0.980	0.071	0.083	0.080	0.078	0.083	0.087	0.090	0.089	0.092	0.097
1.000	-0.076	-0.068	-0.073	-0.071	-0.073	-0.073	-0.073	-0.082	-0.069	-0.075

$M = 0.3$

α	6.0	7.0	8.0	9.0	10.0
C_L	0.794	0.908	1.017	0.975	1.000
C_M	-0.074	-0.073	-0.073	-0.085	-0.101

C_p

x/c					
Upper surface					
0.000	-0.868	-1.452	-2.086	-0.553	-0.667
0.005	-4.072	-4.988	-5.973	-4.016	-2.288
0.010	-4.066	-5.045	-6.143	-1.527	-1.431
0.015	-3.830	-4.638	-5.487	-1.452	-1.873
0.020	-3.615	-4.314	-4.431	-1.449	-1.557
0.030	-2.138	-2.496	-2.831	-1.414	-1.557
0.050	-1.621	-1.852	-2.086	-1.444	-1.478
0.075	-1.263	-1.448	-1.625	-1.431	-1.380
0.100	-1.086	-1.229	-1.379	-1.449	-1.507
0.150	-0.879	-0.995	-1.103	-1.603	-1.505
0.200	-0.783	-0.875	-0.969	-1.490	-1.373
0.260	-0.696	-0.782	-0.855	-1.355	-1.247
0.320	-0.632	-0.698	-0.769	-1.133	-1.145
0.380	-0.569	-0.629	-0.686	-0.846	-1.013
0.440	-0.539	-0.588	-0.638	-0.786	-0.863
0.500	-0.492	-0.539	-0.579	-0.595	-0.678
0.560	-0.458	-0.494	-0.526	-0.506	-0.613
0.620	-0.421	-0.457	-0.483	-0.451	-0.521
0.680	-0.378	-0.408	-0.435	-0.381	-0.474
0.740	-0.337	-0.358	-0.376	-0.331	-0.406
0.800	-0.308	-0.321	-0.337	-0.282	-0.354
0.850	-0.289	-0.293	-0.306	-0.256	-0.314
0.900	-0.261	-0.263	-0.267	-0.235	-0.286
0.950	-0.160	-0.164	-0.169	-0.202	-0.273
0.980	-0.111	-0.117	-0.122	-0.191	-0.236
1.000	-0.076	-0.076	-0.087	-0.169	-0.241
Lower surface					
0.000	-0.868	-1.452	-2.086	-0.553	-0.667
0.005	0.986	0.905	0.780	0.942	0.916
0.010	1.017	1.022	0.999	1.020	1.020
0.020	0.891	0.955	0.997	0.947	0.961
0.050	0.523	0.621	0.708	0.641	0.663
0.100	0.244	0.328	0.417	0.373	0.391
0.150	0.130	0.208	0.282	0.247	0.261
0.200	0.057	0.118	0.187	0.177	0.174
0.280	-0.003	0.047	0.103	0.085	0.085
0.360	-0.052	-0.006	0.042	0.019	0.008
0.440	-0.059	-0.026	0.012	-0.008	-0.022
0.520	-0.024	0.000	0.029	0.005	-0.005
0.600	0.099	0.122	0.141	0.113	0.100
0.680	0.177	0.192	0.212	0.181	0.167
0.740	0.233	0.250	0.261	0.233	0.215
0.800	0.284	0.293	0.304	0.275	0.259
0.850	0.282	0.293	0.301	0.266	0.245
0.900	0.271	0.276	0.285	0.244	0.222
0.950	0.207	0.208	0.212	0.158	0.127
0.980	0.102	0.108	0.110	0.048	0.003
1.000	-0.076	-0.076	-0.087	-0.169	-0.241

Table 3 (continued)

M = 0.4

α	1.0	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0
C_L	0.233	0.294	0.321	0.357	0.410	0.468	0.528	0.590	0.651	0.710
C_M	-0.073	-0.074	-0.074	-0.075	-0.074	-0.076	-0.076	-0.076	-0.077	-0.076

C_p

x/c										
Upper surface										
0.000	0.917	0.836	0.792	0.737	0.618	0.477	0.324	0.147	-0.042	-0.242
0.005	-0.703	-0.963	-1.102	-1.259	-1.550	-1.876	-2.232	-2.586	-2.989	-3.395
0.010	-0.878	-1.121	-1.240	-1.387	-1.658	-1.877	-2.299	-2.674	-3.117	-3.596
0.015	-1.089	-1.309	-1.424	-1.568	-1.832	-2.122	-2.416	-2.756	-3.097	-3.462
0.020	-0.997	-1.173	-1.276	-1.394	-1.607	-1.878	-2.170	-2.503	-2.862	-3.259
0.030	-0.778	-0.962	-1.062	-1.180	-1.297	-1.116	-1.322	-1.518	-1.668	-1.824
0.050	-0.575	-0.660	-0.723	-0.787	-0.895	-1.006	-1.106	-1.222	-1.340	-1.462
0.075	-0.468	-0.553	-0.592	-0.631	-0.715	-0.803	-0.876	-0.970	-1.059	-1.149
0.100	-0.431	-0.503	-0.532	-0.569	-0.632	-0.710	-0.772	-0.844	-0.911	-0.994
0.150	-0.375	-0.435	-0.454	-0.484	-0.535	-0.589	-0.644	-0.700	-0.753	-0.813
0.200	-0.367	-0.415	-0.430	-0.460	-0.495	-0.552	-0.592	-0.633	-0.684	-0.730
0.260	-0.356	-0.396	-0.413	-0.434	-0.469	-0.509	-0.540	-0.584	-0.623	-0.664
0.320	-0.349	-0.383	-0.394	-0.417	-0.442	-0.485	-0.503	-0.540	-0.568	-0.608
0.380	-0.322	-0.353	-0.363	-0.389	-0.405	-0.446	-0.465	-0.491	-0.521	-0.552
0.440	-0.308	-0.355	-0.363	-0.386	-0.401	-0.432	-0.446	-0.474	-0.501	-0.528
0.500	-0.307	-0.330	-0.341	-0.353	-0.374	-0.395	-0.407	-0.437	-0.458	-0.485
0.560	-0.297	-0.321	-0.326	-0.336	-0.355	-0.374	-0.384	-0.413	-0.426	-0.456
0.620	-0.290	-0.312	-0.312	-0.331	-0.343	-0.362	-0.374	-0.386	-0.401	-0.420
0.680	-0.261	-0.283	-0.288	-0.299	-0.312	-0.326	-0.334	-0.350	-0.366	-0.382
0.740	-0.240	-0.256	-0.258	-0.265	-0.273	-0.291	-0.299	-0.305	-0.328	-0.339
0.800	-0.227	-0.244	-0.248	-0.257	-0.263	-0.270	-0.277	-0.288	-0.297	-0.311
0.850	-0.237	-0.241	-0.246	-0.260	-0.262	-0.273	-0.267	-0.282	-0.285	-0.292
0.900	-0.253	-0.242	-0.248	-0.251	-0.258	-0.260	-0.261	-0.266	-0.272	-0.265
0.950	-0.148	-0.153	-0.152	-0.159	-0.159	-0.166	-0.159	-0.165	-0.168	-0.171
0.980	-0.119	-0.120	-0.118	-0.122	-0.121	-0.129	-0.123	-0.119	-0.120	-0.125
1.000	-0.069	-0.071	-0.069	-0.072	-0.075	-0.076	-0.069	-0.076	-0.074	-0.077
Lower surface										
0.000	0.917	0.836	0.792	0.737	0.618	0.477	0.324	0.147	-0.042	-0.242
0.005	0.721	0.805	0.842	0.879	0.936	0.983	1.013	1.032	1.040	1.038
0.010	0.807	0.517	0.569	0.619	0.705	0.784	0.851	0.908	0.953	0.986
0.020	0.201	0.298	0.347	0.393	0.482	0.557	0.633	0.699	0.755	0.808
0.050	-0.186	-0.103	-0.056	-0.019	0.056	0.135	0.217	0.283	0.352	0.408
0.100	-0.328	-0.269	-0.231	-0.202	-0.143	-0.075	-0.015	0.042	0.093	0.145
0.150	-0.354	-0.287	-0.260	-0.235	-0.186	-0.140	-0.084	-0.043	0.004	0.043
0.200	-0.350	-0.308	-0.286	-0.264	-0.230	-0.186	-0.138	-0.094	-0.054	-0.023
0.280	-0.322	-0.295	-0.279	-0.261	-0.229	-0.196	-0.157	-0.123	-0.095	-0.067
0.360	-0.319	-0.298	-0.282	-0.265	-0.240	-0.217	-0.180	-0.157	-0.129	-0.108
0.440	-0.292	-0.270	-0.257	-0.247	-0.228	-0.206	-0.178	-0.155	-0.132	-0.117
0.520	-0.207	-0.185	-0.182	-0.176	-0.157	-0.141	-0.120	-0.100	-0.082	-0.072
0.600	-0.036	-0.026	-0.018	-0.009	0.003	0.010	0.027	0.040	0.056	0.063
0.680	0.078	0.091	0.095	0.099	0.103	0.111	0.129	0.139	0.147	0.152
0.740	0.149	0.155	0.159	0.162	0.173	0.184	0.192	0.203	0.206	0.214
0.800	0.211	0.215	0.219	0.222	0.231	0.238	0.245	0.255	0.261	0.264
0.850	0.225	0.228	0.233	0.233	0.240	0.248	0.257	0.262	0.270	0.272
0.900	0.221	0.227	0.230	0.229	0.233	0.237	0.248	0.251	0.254	0.259
0.950	0.170	0.172	0.174	0.176	0.179	0.179	0.189	0.191	0.194	0.195
0.980	0.087	0.087	0.087	0.087	0.089	0.089	0.096	0.100	0.108	0.099
1.000	-0.069	-0.071	-0.069	-0.072	-0.075	-0.076	-0.069	-0.076	-0.074	-0.077

M = 0.4

α	6.0	7.0	8.0	9.0	10.0
C_L	0.808	0.873	0.925	0.974	1.016
C_M	-0.077	-0.070	-0.080	-0.090	-0.107

C_p

x/c					
Upper surface					
0.000	-0.637	-0.263	-0.290	-0.405	-0.557
0.005	-3.537	-3.967	-3.658	-2.167	-1.631
0.010	-4.278	-1.722	-1.497	-1.490	-1.430
0.015	-2.579	-1.907	-1.540	-2.284	-1.906
0.020	-3.958	-1.698	-1.473	-1.750	-1.932
0.030	-2.240	-1.759	-1.492	-1.796	-1.812
0.050	-1.651	-1.645	-1.445	-1.504	-1.551
0.075	-1.310	-1.651	-1.471	-1.534	-1.560
0.100	-1.133	-1.687	-1.521	-1.596	-1.598
0.150	-0.909	-1.581	-1.534	-1.547	-1.509
0.200	-0.797	-1.235	-1.457	-1.310	-1.273
0.260	-0.724	-1.031	-1.292	-1.321	-1.327
0.320	-0.662	-0.787	-1.075	-1.120	-1.150
0.380	-0.590	-0.625	-0.765	-0.934	-1.048
0.440	-0.563	-0.551	-0.723	-0.790	-0.854
0.500	-0.512	-0.472	-0.568	-0.623	-0.704
0.560	-0.471	-0.459	-0.484	-0.565	-0.696
0.620	-0.439	-0.399	-0.428	-0.478	-0.543
0.680	-0.396	-0.364	-0.369	-0.430	-0.533
0.740	-0.345	-0.324	-0.329	-0.384	-0.472
0.800	-0.315	-0.288	-0.294	-0.332	-0.413
0.850	-0.290	-0.261	-0.259	-0.296	-0.386
0.900	-0.262	-0.230	-0.234	-0.266	-0.335
0.950	-0.171	-0.177	-0.198	-0.237	-0.320
0.980	-0.117	-0.152	-0.183	-0.213	-0.275
1.000	-0.072	-0.115	-0.158	-0.208	-0.288
Lower surface					
0.000	-0.637	-0.263	-0.290	-0.405	-0.557
0.005	1.017	1.018	1.008	0.985	0.955
0.010	1.029	1.024	1.031	1.038	1.038
0.020	0.894	0.891	0.915	0.945	0.963
0.050	0.521	0.540	0.576	0.626	0.655
0.100	0.240	0.271	0.310	0.354	0.376
0.150	0.131	0.155	0.187	0.226	0.244
0.200	0.054	0.085	0.109	0.141	0.149
0.280	-0.003	0.016	0.038	0.060	0.067
0.360	-0.052	-0.035	-0.021	-0.004	-0.008
0.440	-0.068	-0.058	-0.050	-0.040	-0.047
0.520	-0.029	-0.025	-0.023	-0.016	-0.030
0.600	0.097	0.093	0.092	0.094	0.082
0.680	0.180	0.172	0.169	0.165	0.149
0.740	0.235	0.227	0.220	0.211	0.195
0.800	0.283	0.275	0.266	0.254	0.239
0.850	0.287	0.278	0.264	0.252	0.227
0.900	0.272	0.260	0.247	0.231	0.206
0.950	0.208	0.186	0.166	0.146	0.107
0.980	0.106	0.079	0.050	0.025	-0.050
1.000	-0.072	-0.115	-0.158	-0.208	-0.288

Table 3 (continued)

M = 0.5

α	1.0	1.5	1.75	2.0	3.0	4.0	9.0	10.0	11.0	12.0
C_L	0.254	0.322	0.354	0.385	0.504	0.627	0.968	1.004	1.026	1.069
C_M	-0.078	-0.078	-0.078	-0.079	-0.080	-0.078	-0.113	-0.127	-0.141	-0.163
C_D	0.0106	0.0107	0.0108	0.0109	0.0117	0.0149				

C_p

x/c										
Upper surface										
0.000	0.9236	0.8377	0.7911	0.7419	0.5114	0.2368	-0.141	-0.231	-0.313	-0.481
0.005	-0.7059	-0.9785	-1.1128	-1.2498	-1.8109	-2.3152	-1.871	-1.614	-1.362	-0.862
0.010	-0.9144	-1.1743	-1.3027	-1.4381	-2.0430	-2.8969	-1.401	-1.381	-1.420	-1.876
0.015	-1.1792	-1.4484	-1.5848	-1.7279	-2.3194	-2.6339	-1.485	-1.855	-1.514	-0.813
0.020	-1.0810	-1.3008	-1.4120	-1.5368	-2.1774	-2.6275	-1.479	-1.535	-1.676	-1.962
0.030	-0.8727	-1.1220	-1.2385	-1.3521	-1.1462	-2.4953	-1.420	-1.593	-1.819	-2.486
0.050	-0.5942	-0.7945	-0.7992	-0.8536	-1.0543	-1.2476	-1.376	-1.342	-1.503	-1.679
0.075	-0.5128	-0.6034	-0.6444	-0.6868	-0.8540	-1.0126	-1.353	-1.406	-1.435	-1.752
0.100	-0.4626	-0.5354	-0.5687	-0.6048	-0.7460	-0.8827	-1.389	-1.487	-1.511	-1.381
0.150	-0.4116	-0.4681	-0.4951	-0.5220	-0.6330	-0.7415	-1.418	-1.380	-1.312	-1.407
0.200	-0.4038	-0.4525	-0.4739	-0.4973	-0.5892	-0.6765	-1.334	-1.223	-1.120	-0.856
0.260	-0.3918	-0.4306	-0.4498	-0.4689	-0.5447	-0.6221	-1.274	-1.250	-1.209	-1.186
0.320	-0.3798	-0.4171	-0.4314	-0.4477	-0.5129	-0.5790	-1.132	-1.131	-1.092	-1.046
0.380	-0.3550	-0.3852	-0.3989	-0.4137	-0.4705	-0.5259	-0.992	-1.028	-1.026	-0.915
0.440	-0.3592	-0.3859	-0.3975	-0.4109	-0.4599	-0.5083	-0.909	-0.922	-0.939	-0.942
0.500	-0.3337	-0.3583	-0.3684	-0.3798	-0.4258	-0.4665	-0.755	-0.810	-0.851	-0.843
0.560	-0.3245	-0.3434	-0.3550	-0.3649	-0.4005	-0.4368	-0.684	-0.761	-0.839	-0.913
0.620	-0.3125	-0.3334	-0.3394	-0.3493	-0.3814	-0.4114	-0.588	-0.651	-0.692	-0.810
0.680	-0.3075	-0.3235	-0.3309	-0.3387	-0.3644	-0.3880	-0.530	-0.608	-0.704	-0.850
0.740	-0.2799	-0.2916	-0.2983	-0.3033	-0.3277	-0.3470	-0.451	-0.567	-0.658	-0.834
0.800	-0.2721	-0.2845	-0.2877	-0.2927	-0.3086	-0.3222	-0.414	-0.507	-0.588	-0.754
0.850	-0.2530	-0.2604	-0.2636	-0.2672	-0.2796	-0.2868	-0.367	-0.461	-0.564	-0.750
0.900	-0.2218	-0.2285	-0.2303	-0.2325	-0.2385	-0.2415	-0.340	-0.418	-0.502	-0.653
0.950	-0.1658	-0.1696	-0.1694	-0.1715	-0.1727	-0.1714	-0.298	-0.399	-0.504	-0.697
0.980	-0.1077	-0.1086	-0.1084	-0.1091	-0.1097	-0.1105	-0.280	-0.359	-0.439	-0.477
1.000	-0.0631	-0.0639	-0.0645	-0.0645	-0.0651	-0.0694	-0.269	-0.358	-0.446	-0.611
Lower surface										
0.000	0.9236	0.8377	0.7911	0.7419	0.5114	0.2368	-0.141	-0.231	-0.313	-0.481
0.005	0.7533	0.8391	0.8744	0.9065	1.0023	1.0514	1.046	1.029	1.019	1.005
0.010	0.4402	0.5518	0.6009	0.6472	0.8015	0.9145	1.050	1.058	1.060	1.063
0.020	0.2221	0.3233	0.3727	0.4146	0.5746	0.7044	0.934	0.959	0.971	0.990
0.050	-0.1765	-0.0809	-0.0375	0.0035	0.1601	0.2958	0.591	0.628	0.649	0.675
0.100	-0.3387	-0.2689	-0.2317	-0.2006	-0.0757	0.0375	0.324	0.351	0.369	0.392
0.150	-0.3571	-0.2987	-0.2721	-0.2438	-0.1423	-0.0474	0.188	0.215	0.226	0.246
0.200	-0.3812	-0.3327	-0.3082	-0.2870	-0.1975	-0.1162	0.107	0.123	0.134	0.136
0.280	-0.3500	-0.3129	-0.2941	-0.2750	-0.2053	-0.1388	0.023	0.036	0.041	0.048
0.360	-0.3465	-0.3164	-0.2983	-0.2856	-0.2265	-0.1728	-0.044	-0.058	-0.040	-0.045
0.440	-0.3125	-0.2866	-0.2742	-0.2622	-0.2145	-0.1707	-0.078	-0.082	-0.092	-0.105
0.520	-0.2225	-0.2044	-0.1928	-0.1843	-0.1465	-0.1126	-0.054	-0.063	-0.075	-0.090
0.600	-0.0432	-0.0284	-0.0212	-0.0134	0.0127	0.0361	0.067	0.055	0.039	0.027
0.680	0.0773	0.0873	0.0943	0.0993	0.1197	0.1382	0.146	0.128	0.113	0.094
0.740	0.1553	0.1641	0.1710	0.1745	0.1920	0.2070	0.196	0.177	0.160	0.132
0.800	0.2157	0.2259	0.2292	0.2327	0.2487	0.2603	0.243	0.222	0.202	0.169
0.850	0.2327	0.2387	0.2434	0.2462	0.2594	0.2709	0.237	0.212	0.186	0.151
0.900	0.2334	0.2387	0.2420	0.2455	0.2558	0.2638	0.217	0.189	0.164	0.137
0.950	0.1802	0.1833	0.1873	0.1887	0.1963	0.2014	0.119	0.078	0.046	0.007
0.980	0.0929	0.0944	0.0964	0.0979	0.1027	0.1042	-0.012	-0.063	-0.113	-0.187
1.000	-0.0631	-0.0639	-0.0645	-0.0645	-0.0651	-0.0694	-0.269	-0.358	-0.446	-0.611

M = 0.5

α	13.0	14.0
C_L	1.093	1.108
C_M	-0.177	-0.182

C_p

x/c		
Upper surface		
0.000	-0.574	-0.675
0.005	-0.789	-0.766
0.010	-1.882	-1.650
0.015	-0.773	-0.765
0.020	-1.946	-1.900
0.030	-2.600	-2.748
0.050	-1.687	-1.700
0.075	-1.764	-1.753
0.100	-1.229	-1.245
0.150	-1.409	-1.355
0.200	-0.806	-0.790
0.260	-1.211	-1.299
0.320	-1.110	-1.139
0.380	-0.879	-0.848
0.440	-0.981	-0.989
0.500	-0.893	-0.919
0.560	-0.900	-0.890
0.620	-0.868	-0.887
0.680	-0.909	-0.915
0.740	-0.888	-0.914
0.800	-0.868	-0.919
0.850	-0.861	-0.909
0.900	-0.779	-0.861
0.950	-0.778	-0.837
0.980	-0.562	-0.655
1.000	-0.732	-0.815
Lower surface		
0.000	-0.574	-0.675
0.005	0.989	0.966
0.010	1.063	1.061
0.020	1.006	1.019
0.050	0.702	0.732
0.100	0.420	0.445
0.150	0.268	0.294
0.200	0.152	0.171
0.280	0.057	0.073
0.360	-0.038	-0.031
0.440	-0.107	-0.102
0.520	-0.097	-0.102
0.600	0.017	0.009
0.680	0.079	0.067
0.740	0.118	0.101
0.800	0.150	0.133
0.850	0.126	0.106
0.900	0.111	0.086
0.950	-0.034	-0.068
0.980	-0.255	-0.307
1.000	-0.732	-0.815

Table 3 (continued)

M = 0.6

α	1.0	1.5	1.75	2.0	3.0	4.0	7.0	8.0	9.0	10.0
C_L	0.268	0.341	0.374	0.407	0.536	0.664	0.919	0.962	0.991	1.004
C_M	-0.084	-0.084	-0.084	-0.084	-0.084	-0.080	-0.082	-0.100	-0.124	-0.147
C_D	0.0108	0.0110	0.0113	0.0116	0.0146	0.0227				

C_p

x/c										
Upper surface										
0.000	0.9734	0.9036	0.8660	0.8285	0.6671	0.4956	0.199	0.131	0.103	0.065
0.005	-0.6008	-0.8155	-0.9128	-1.0027	-1.3446	-1.6244	-1.992	-1.800	-1.730	-1.516
0.010	-0.8556	-1.0764	-1.1770	-1.2755	-1.8127	-2.1832	-2.182	-1.908	-1.329	-1.230
0.015	-1.2734	-1.6203	-1.7518	-1.8619	-2.1301	-2.2221	-1.833	-1.686	-1.669	-1.549
0.020	-1.1607	-1.4408	-1.5980	-1.7498	-2.0790	-2.0915	-1.803	-1.693	-1.667	-1.498
0.030	-0.9658	-1.3261	-1.5490	-1.7372	-2.0980	-2.0915	-1.834	-1.737	-1.498	-1.464
0.050	-0.6272	-0.7670	-0.7978	-0.8108	-1.4273	-1.9072	-1.834	-1.672	-1.383	-1.284
0.075	-0.5486	-0.6394	-0.6816	-0.7201	-0.9098	-1.5622	-1.756	-1.620	-1.481	-1.315
0.100	-0.4921	-0.5686	-0.6061	-0.6404	-0.7610	-1.2988	-1.744	-1.643	-1.569	-1.439
0.150	-0.4403	-0.5011	-0.5311	-0.5586	-0.6650	-0.8215	-1.532	-1.471	-1.330	-1.215
0.200	-0.4345	-0.4858	-0.5116	-0.5338	-0.6259	-0.6991	-1.419	-1.414	-1.328	-1.223
0.250	-0.4198	-0.4631	-0.4841	-0.5042	-0.5874	-0.6389	-1.166	-1.234	-1.263	-1.192
0.300	-0.4092	-0.4462	-0.4640	-0.4815	-0.5536	-0.6030	-0.984	-1.083	-1.159	-1.149
0.350	-0.3828	-0.4161	-0.4323	-0.4467	-0.5092	-0.5565	-0.824	-0.947	-0.987	-1.022
0.400	-0.3691	-0.4176	-0.4323	-0.4456	-0.5002	-0.5406	-0.722	-0.848	-0.999	-1.026
0.500	-0.3616	-0.3825	-0.4016	-0.4129	-0.4606	-0.4962	-0.602	-0.737	-0.849	-0.921
0.560	-0.3500	-0.3727	-0.3847	-0.3944	-0.4353	-0.4651	-0.536	-0.624	-0.702	-0.807
0.620	-0.3400	-0.3590	-0.3694	-0.3770	-0.4131	-0.4376	-0.473	-0.548	-0.665	-0.745
0.680	-0.3342	-0.3511	-0.3599	-0.3648	-0.3935	-0.4117	-0.415	-0.481	-0.575	-0.679
0.740	-0.3009	-0.3152	-0.3234	-0.3278	-0.3507	-0.3646	-0.365	-0.427	-0.526	-0.620
0.800	-0.2940	-0.3046	-0.3107	-0.3141	-0.3290	-0.3361	-0.330	-0.388	-0.481	-0.597
0.850	-0.2713	-0.2797	-0.2857	-0.2850	-0.2952	-0.2969	-0.292	-0.345	-0.428	-0.552
0.900	-0.2359	-0.2401	-0.2440	-0.2438	-0.2481	-0.2477	-0.262	-0.318	-0.405	-0.513
0.950	-0.1719	-0.1740	-0.1758	-0.1740	-0.1757	-0.1773	-0.218	-0.275	-0.369	-0.481
0.980	-0.1079	-0.1090	-0.1106	-0.1100	-0.1127	-0.1186	-0.199	-0.247	-0.343	-0.453
1.000	-0.0603	-0.0613	-0.0630	-0.0629	-0.0672	-0.0757	-0.179	-0.259	-0.340	-0.430
Lower surface										
0.000	0.9734	0.9036	0.8660	0.8285	0.6671	0.4956	0.199	0.131	0.103	0.065
0.005	0.7726	0.8536	0.8858	0.9164	1.0091	1.0602	1.092	1.092	1.087	1.084
0.010	0.4564	0.5631	0.6088	0.6519	0.7980	0.8986	1.035	1.055	1.063	1.072
0.020	0.2357	0.3359	0.3792	0.4224	0.5740	0.6881	0.875	0.904	0.924	0.942
0.050	-0.1846	-0.0883	-0.0455	-0.0031	0.1515	0.2783	0.497	0.540	0.570	0.602
0.100	-0.3712	-0.2930	-0.2594	-0.2252	-0.0931	0.0174	0.232	0.271	0.301	0.325
0.150	-0.3939	-0.3300	-0.3027	-0.2729	-0.1635	-0.0699	0.103	0.135	0.159	0.180
0.200	-0.4208	-0.3664	-0.3409	-0.3167	-0.2233	-0.1408	0.027	0.054	0.076	0.094
0.250	-0.3865	-0.3442	-0.3260	-0.3051	-0.2296	-0.1651	-0.038	-0.020	-0.007	0.003
0.300	-0.3828	-0.3465	-0.3324	-0.3157	-0.2534	-0.1980	-0.097	-0.086	-0.080	-0.075
0.400	-0.3416	-0.3150	-0.3027	-0.2877	-0.2386	-0.1938	-0.120	-0.116	-0.119	-0.124
0.500	-0.2990	-0.2784	-0.2702	-0.2599	-0.1630	-0.1286	-0.076	-0.081	-0.088	-0.099
0.600	-0.0444	-0.0285	-0.0258	-0.0158	0.0111	0.0349	0.064	0.056	0.046	0.032
0.680	0.0841	0.0953	0.0985	0.1053	0.1255	0.1425	0.157	0.147	0.131	0.114
0.740	0.1652	0.1753	0.1786	0.1837	0.2008	0.2152	0.217	0.204	0.188	0.165
0.800	0.2272	0.2373	0.2396	0.2447	0.2591	0.2709	0.269	0.253	0.235	0.213
0.850	0.2463	0.2546	0.2555	0.2601	0.2729	0.2815	0.272	0.252	0.228	0.203
0.900	0.2473	0.2537	0.2555	0.2589	0.2681	0.2752	0.254	0.232	0.208	0.181
0.950	0.1927	0.1970	0.1972	0.2002	0.2066	0.2109	0.172	0.138	0.105	0.054
0.980	0.1021	0.1048	0.1054	0.1064	0.1091	0.1091	0.050	0.001	-0.044	-0.099
1.000	-0.0603	-0.0613	-0.0630	-0.0629	-0.0672	-0.0757	-0.179	-0.259	-0.340	-0.430

	M = 0.6				M = 0.62	M = 0.64
α	11.0	12.0	13.0	14.0	7.0	7.0
C_L	1.017	1.032	1.051	1.149	0.932	0.943
C_M	-0.166	-0.178	-0.189	-0.199	-0.086	-0.092

C_p

x/c						
Upper surface						
0.000	0.044	-0.019	-0.128	-0.303	0.276	0.344
0.005	-1.453	-1.565	-1.652	-0.863	-1.869	-1.711
0.010	-1.217	-1.275	-1.283	-1.638	-2.026	-1.896
0.015	-1.455	-1.432	-1.388	-0.857	-1.924	-1.880
0.020	-1.407	-1.462	-1.339	-1.805	-1.842	-1.850
0.040	-1.348	-1.508	-1.417	-2.147	-1.895	-1.841
0.050	-1.245	-1.219	-1.276	-1.609	-1.837	-1.832
0.075	-1.150	-1.077	-1.184	-1.661	-1.758	-1.723
0.100	-1.314	-1.278	-1.395	-1.591	-1.743	-1.700
0.150	-1.177	-1.123	-1.088	-1.462	-1.552	-1.557
0.200	-1.130	-1.105	-1.069	-0.842	-1.415	-1.417
0.250	-1.177	-1.126	-1.058	-1.265	-1.202	-1.253
0.300	-1.130	-1.094	-1.045	-1.192	-1.039	-1.084
0.380	-1.029	-1.052	-1.052	-0.911	-0.870	-0.926
0.440	-1.043	-1.034	-1.044	-1.048	-0.759	-0.814
0.500	-0.942	-0.986	-1.004	-1.008	-0.696	-0.675
0.560	-0.883	-0.904	-0.972	-0.956	-0.562	-0.592
0.620	-0.842	-0.880	-0.917	-0.941	-0.492	-0.517
0.680	-0.776	-0.848	-0.909	-0.971	-0.432	-0.454
0.740	-0.743	-0.795	-0.878	-0.969	-0.377	-0.397
0.800	-0.702	-0.772	-0.837	-0.971	-0.340	-0.359
0.850	-0.655	-0.724	-0.811	-0.971	-0.298	-0.316
0.900	-0.596	-0.737	-0.769	-0.917	-0.271	-0.285
0.950	-0.589	-0.672	-0.746	-0.892	-0.230	-0.244
0.980	-0.520	-0.628	-0.709	-0.727	-0.211	-0.225
1.000	-0.512	-0.605	-0.694	-0.879	-0.194	-0.212
Lower surface						
0.000	0.024	-0.019	-0.128	-0.303	0.276	0.344
0.005	1.078	1.068	1.062	1.041	1.099	1.102
0.010	1.076	1.083	1.086	1.092	1.055	1.027
0.020	0.959	0.981	0.995	1.025	0.868	0.857
0.050	0.621	0.655	0.686	0.724	0.489	0.498
0.100	0.348	0.374	0.406	0.446	0.223	0.212
0.150	0.194	0.225	0.247	0.285	0.094	0.080
0.200	0.107	0.128	0.145	0.166	0.017	0.007
0.280	0.008	0.021	0.036	0.058	-0.049	-0.059
0.360	-0.075	-0.068	-0.061	-0.048	-0.106	-0.118
0.440	-0.126	-0.115	-0.130	-0.125	-0.130	-0.143
0.520	-0.113	-0.116	-0.125	-0.125	-0.086	-0.096
0.600	0.019	0.005	-0.002	-0.002	0.061	0.053
0.680	0.099	0.083	0.070	0.062	0.152	0.152
0.740	0.149	0.134	0.133	0.105	0.216	0.212
0.800	0.193	0.172	0.162	0.141	0.269	0.265
0.850	0.182	0.159	0.141	0.116	0.271	0.266
0.900	0.153	0.123	0.101	0.090	0.256	0.251
0.950	0.029	-0.009	-0.038	-0.066	0.171	0.164
0.980	-0.152	-0.196	-0.247	-0.309	0.045	0.034
1.000	-0.512	-0.605	-0.694	-0.879	-0.194	-0.212

Table 3 (continued)

M = 0.65

α	4.0	4.5	5.0	5.5	6.0	6.5	7.0
c_L	0.726	0.587	0.869	0.951	1.032	1.044	0.952
c_M	-0.080	-0.023	-0.075	-0.071	-0.330	-0.070	-0.093
c_D	0.0231	0.028	0.036		0.055		

c_p

x/c								
Upper surface								
0.000	0.6067	0.591	0.522	0.462	0.394	0.402	0.375	0.393
0.005	-1.3114	-1.394	-1.477	-1.548	-1.630	-1.612	-1.640	-1.585
0.010	-1.8165	-2.314	-1.974	-2.031	-2.093	-1.891	-1.916	-1.881
0.015	-2.2207	-2.394	-2.388	-2.434	-2.499	-2.141	-1.956	-2.403
0.020	-2.3396	-2.424	-2.448	-2.503	-2.582	-2.455	-1.942	-2.531
0.030	-2.3612	-2.349	-2.500	-3.378	-2.620	-2.619	-1.947	-2.451
0.050	-2.2245	-2.185	-2.428	-2.495	-2.561	-2.591	-1.903	-2.446
0.075	-2.1183	-2.122	-2.324	-2.396	-2.469	-2.517	-1.808	-2.213
0.100	-2.0654	-1.087	-2.219	-2.314	-2.394	-2.443	-1.756	-2.357
0.150	-0.7806	-0.596	-2.083	-2.151	-2.262	-2.321	-1.527	-1.786
0.200	-0.6190	-0.622	-0.811	-1.467	-2.165	-1.508	-1.413	-1.467
0.260	-0.6387	-0.626	-0.578	-0.652	-1.030	-1.186	-1.233	-1.883
0.320	-0.6284	-0.594	-0.605	-0.567	-0.591	-0.988	-1.067	-1.180
0.380	-0.5876	-0.584	-0.594	-0.585	-0.557	-0.883	-0.950	-0.878
0.440	-0.5796	-0.557	-0.590	-0.585	-0.569	-0.670	-0.817	-0.724
0.500	-0.5295	-0.507	-0.547	-0.550	-0.546	-0.539	-0.689	-0.531
0.560	-0.4966	-0.478	-0.516	-0.521	-0.522	-0.516	-0.606	-0.487
0.620	-0.4690	-0.428	-0.487	-0.493	-0.496	-0.494	-0.533	-0.570
0.680	-0.4422	-0.377	-0.436	-0.443	-0.447	-0.447	-0.468	-0.470
0.740	-0.3888	-0.349	-0.381	-0.387	-0.395	-0.395	-0.408	-0.404
0.800	-0.3620	-0.329	-0.352	-0.358	-0.365	-0.367	-0.368	-0.379
0.850	-0.3226	-0.302	-0.335	-0.340	-0.346	-0.346	-0.326	-0.345
0.900	-0.2668	-0.187	-0.308	-0.313	-0.319	-0.295	-0.295	-0.315
0.950	-0.1879	-0.140	-0.193	-0.197	-0.205	-0.219	-0.251	-0.230
0.980	-0.1221	-0.078	-0.145	-0.150	-0.161	-0.192	-0.234	-0.198
1.000	-0.0733	1.078	-0.083	-0.087	-0.096	-0.107	-0.218	-0.152
Lower surface								
0.000	0.6067	0.591	0.522	0.462	0.394	0.402	0.375	0.393
0.005	1.0638	0.925	1.092	1.102	1.107	1.109	1.108	1.112
0.010	0.8918	0.723	0.981	0.990	1.018	1.036	1.026	1.051
0.020	0.6852	0.512	0.769	0.808	0.844	0.871	0.854	0.892
0.050	0.2747	0.061	0.366	0.413	0.460	0.495	0.474	0.523
0.100	0.0098	-0.053	0.113	0.157	0.199	0.234	0.207	0.249
0.150	-0.0780	-0.102	-0.006	0.036	0.072	0.106	0.075	0.128
0.200	-0.1513	-0.145	-0.060	-0.028	0.007	0.032	0.002	0.050
0.280	-0.1743	-0.183	-0.110	-0.081	-0.053	-0.067	-0.064	-0.060
0.360	-0.2118	-0.185	-0.154	-0.130	-0.106	-0.127	-0.124	-0.130
0.440	-0.2062	-0.176	-0.160	-0.139	-0.121	-0.147	-0.150	-0.116
0.520	-0.1345	0.051	-0.097	-0.082	-0.069	-0.096	-0.101	-0.097
0.600	0.0180	0.160	0.064	0.074	0.082	0.058	0.051	0.089
0.680	0.1486	0.227	0.170	0.178	0.184	0.158	0.150	0.171
0.740	0.2229	0.286	0.236	0.243	0.248	0.222	0.211	0.210
0.800	0.2804	0.296	0.293	0.298	0.300	0.276	0.265	0.293
0.850	0.2922	0.288	0.301	0.306	0.308	0.279	0.265	0.301
0.900	0.2869	0.222	0.290	0.294	0.295	0.269	0.250	0.290
0.950	0.2201	0.114	0.225	0.225	0.226	0.187	0.160	0.215
0.980	0.1161		0.115	0.114	0.112	0.066	0.031	0.100
1.000	-0.0733	1.078	-0.083	-0.087	-0.096	-0.107	-0.218	-0.152

M = 0.67

α	4.5	5.0	6.0	7.0
c_L	0.836	0.912	1.090	1.212
c_M	-0.079	-0.077	-0.078	-0.087
c_D	0.031	0.040	0.063	

M = 0.68

	3.5	7.0
	0.654	1.231
	-0.085	-0.096
	0.020	

c_p

x/c							
Upper surface							
0.000	0.636	0.577	0.463	0.376	0.786	0.423	
0.005	-1.271	-1.345	-1.482	-1.574	-1.006	-1.489	
0.010	-1.759	-1.825	-1.931	-1.997	-1.474	-1.910	
0.015	-2.159	-2.215	-2.323	-2.390	-1.925	-2.297	
0.020	-2.299	-2.385	-2.401	-2.470	-2.022	-2.374	
0.030	-2.272	-2.336	-2.439	-2.505	-2.061	-2.415	
0.050	-2.216	-2.278	-2.392	-2.460	-1.981	-2.369	
0.075	-2.118	-2.189	-2.310	-2.390	-1.863	-2.301	
0.100	-2.042	-2.117	-2.245	-2.325	-1.762	-2.240	
0.150	-1.899	-2.002	-2.147	-2.227	-0.935	-2.148	
0.200	-1.434	-1.929	-2.065	-2.154	-0.513	-2.079	
0.260	-0.517	-0.852	-2.032	-2.099	-0.583	-2.042	
0.320	-0.547	-0.802	-1.110	-1.729	-0.595	-1.956	
0.380	-0.558	-0.521	-0.780	-1.113	-0.564	-1.165	
0.440	-0.570	-0.548	-0.526	-0.728	-0.561	-0.916	
0.500	-0.537	-0.527	-0.474	-0.697	-0.519	-0.720	
0.560	-0.513	-0.510	-0.464	-0.483	-0.493	-0.657	
0.620	-0.487	-0.488	-0.466	-0.473	-0.467	-0.486	
0.680	-0.439	-0.441	-0.430	-0.428	-0.421	-0.435	
0.740	-0.386	-0.389	-0.391	-0.396	-0.371	-0.389	
0.800	-0.358	-0.362	-0.366	-0.385	-0.344	-0.376	
0.850	-0.343	-0.347	-0.351	-0.362	-0.331	-0.345	
0.900	-0.319	-0.324	-0.331	-0.350	-0.307	-0.327	
0.950	-0.196	-0.201	-0.233	-0.233	-0.185	-0.233	
0.980	-0.145	-0.151	-0.166	-0.220	-0.134	-0.245	
1.000	-0.079	-0.083	-0.096	-0.128	-0.071	-0.115	
Lower surface							
0.000	0.636	0.577	0.463	0.376	0.786	0.423	
0.005	1.080	1.045	1.112	1.116	1.031	1.119	
0.010	0.923	0.957	1.013	1.044	0.865	1.038	
0.020	0.723	0.765	0.835	0.880	0.614	0.872	
0.030	0.512	0.561	0.650	0.509	0.386	0.497	
0.100	0.062	0.109	0.192	0.246	-0.054	0.233	
0.150	-0.054	-0.010	0.064	0.108	-0.161	0.102	
0.200	-0.103	-0.065	-0.000	0.039	-0.200	0.029	
0.280	-0.147	-0.115	-0.060	-0.030	-0.225	-0.041	
0.360	-0.187	-0.160	-0.114	-0.091	-0.256	-0.101	
0.440	-0.188	-0.165	-0.128	-0.113	-0.242	-0.125	
0.520	-0.116	-0.100	-0.072	-0.067	-0.157	-0.077	
0.600	0.053	0.065	0.082	0.081	0.025	0.075	
0.680	0.164	0.173	0.184	0.181	0.145	0.177	
0.740	0.252	0.240	0.250	0.245	0.217	0.241	
0.800	0.290	0.296	0.304	0.300	0.275	0.296	
0.850	0.301	0.306	0.312	0.305	0.290	0.302	
0.900	0.292	0.296	0.300	0.284	0.284	0.281	
0.950	0.227	0.229	0.230	0.208	0.221	0.204	
0.980	0.118	0.118	0.115	0.059	0.118	0.090	
1.000	-0.079	-0.083	-0.096	-0.128	-0.071	-0.115	

Table 3 (continued)

M = 0.69

α	4.5	5.0	6.0	7.0
c_L	0.896	1.011	1.188	1.250
c_M	-0.081	-0.085	-0.104	-0.115
c_D	0.035	0.046	0.076	

M = 0.7

α	1.0	1.5	1.75	2.0	2.5
c_L	0.285	0.364	0.401	0.450	0.519
c_M	-0.092	-0.092	-0.093	-0.092	-0.088
c_D	0.0111	0.0115	0.0121	0.0126	0.015

c_p

x/c									
Upper surface									
0.000	0.686	0.631	0.534	0.468	1.0378	0.9931	0.9681	0.9405	0.922
0.005	-1.147	-1.215	-1.331	-1.407	-0.3747	-0.4928	-0.5509	-0.6105	-0.693
0.010	-1.619	-1.678	-1.775	-1.829	-0.6324	-0.7494	-0.8107	-0.8767	-0.996
0.015	-2.006	-2.065	-2.154	-2.207	-1.3398	-1.4535	-1.4973	-1.5399	-1.624
0.020	-2.086	-2.131	-2.223	-2.286	-1.3782	-1.5785	-1.6328	-1.6855	-1.752
0.030	-2.119	-2.177	-2.271	-2.325	-1.1985	-1.4132	-1.5699	-1.6934	-1.769
0.050	-2.073	-2.129	-2.228	-2.279	-0.6417	-1.3229	-1.4243	-1.4906	-1.642
0.075	-1.988	-2.050	-2.152	-2.216	-0.5741	-0.5489	-0.7629	-1.3973	-1.488
0.100	-1.924	-1.987	-2.095	-2.158	-0.5311	-0.5648	-0.5127	-0.5291	-1.439
0.150	-1.821	-1.892	-2.006	-2.072	-0.4850	-0.5427	-0.5609	-0.5611	-0.494
0.200	-1.757	-1.825	-1.938	-2.007	-0.4846	-0.5369	-0.5609	-0.5769	-0.569
0.250	-1.714	-1.801	-1.909	-1.977	-0.4694	-0.5173	-0.5412	-0.5648	-0.581
0.320	-0.647	-1.758	-1.883	-1.948	-0.4605	-0.5036	-0.5240	-0.5461	-0.566
0.380	-0.453	-0.722	-1.346	-1.279	-0.4347	-0.4711	-0.4895	-0.5100	-0.530
0.440	-0.495	-0.525	-1.039	-1.034	-0.4423	-0.4745	-0.4920	-0.5104	-0.527
0.500	-0.490	-0.432	-0.957	-0.912	-0.4145	-0.4428	-0.4576	-0.4734	-0.488
0.560	-0.491	-0.451	-0.726	-0.873	-0.4009	-0.4254	-0.4383	-0.4522	-0.466
0.620	-0.477	-0.454	-0.485	-0.655	-0.3878	-0.4087	-0.4194	-0.4310	-0.444
0.680	-0.437	-0.425	-0.404	-0.565	-0.3794	-0.3966	-0.4055	-0.4157	-0.404
0.740	-0.390	-0.386	-0.353	-0.447	-0.3401	-0.3559	-0.3618	-0.3704	-0.358
0.800	-0.363	-0.362	-0.336	-0.387	-0.3295	-0.3396	-0.3445	-0.3504	-0.332
0.850	-0.351	-0.352	-0.319	-0.337	-0.3003	-0.3071	-0.3109	-0.3155	-0.322
0.900	-0.330	-0.332	-0.311	-0.338	-0.2564	-0.2592	-0.2609	-0.2647	-0.304
0.950	-0.202	-0.208	-0.207	-0.230	-0.1777	-0.1788	-0.1789	-0.1819	-0.180
0.980	-0.151	-0.158	-0.172	-0.248	-0.1075	-0.1080	-0.1086	-0.1099	-0.129
1.000	-0.079	-0.085	-0.099	-0.159	-0.0588	-0.0596	-0.0597	-0.0612	-0.067
Lower surface									
0.000	0.686	0.631	0.534	0.468	1.0378	0.9931	0.9681	0.9405	0.922
0.005	1.080	1.095	1.114	1.122	0.7925	0.8585	0.8887	0.9178	0.954
0.010	0.916	0.949	1.001	1.033	0.4776	0.5647	0.6082	0.6490	0.698
0.020	0.717	0.757	0.821	0.862	0.2576	0.3441	0.3863	0.4281	0.481
0.050	0.307	0.352	0.433	0.485	-0.1887	-0.0984	-0.0543	-0.0099	0.036
0.100	0.056	0.100	0.175	0.223	-0.4250	-0.3413	-0.3000	-0.2581	-0.195
0.150	-0.060	-0.019	0.047	0.091	-0.4588	-0.3871	-0.3530	-0.3167	-0.286
0.200	-0.110	-0.074	-0.013	0.015	-0.4939	-0.4316	-0.4004	-0.3683	-0.313
0.250	-0.154	-0.124	-0.076	-0.050	-0.4554	-0.4071	-0.3815	-0.3562	-0.321
0.320	-0.195	-0.170	-0.129	-0.110	-0.4508	-0.4104	-0.3904	-0.3687	-0.339
0.380	-0.194	-0.174	-0.144	-0.136	-0.3954	-0.3646	-0.3496	-0.3329	-0.310
0.440	-0.120	-0.106	-0.084	-0.086	-0.2661	-0.2455	-0.2344	-0.2227	-0.204
0.500	0.053	0.064	0.075	0.069	-0.0478	-0.0317	-0.0240	-0.0158	-0.003
0.560	0.167	0.174	0.182	0.171	0.0905	0.1022	0.1082	0.1154	0.125
0.620	0.236	0.241	0.247	0.237	0.1758	0.1852	0.1913	0.1967	0.201
0.680	0.294	0.299	0.304	0.292	0.2394	0.2492	0.2541	0.2593	0.263
0.740	0.305	0.308	0.310	0.297	0.2593	0.2680	0.2723	0.2769	0.280
0.800	0.297	0.300	0.299	0.278	0.2623	0.2697	0.2731	0.2764	0.277
0.850	0.251	0.251	0.228	0.197	0.2072	0.2120	0.2145	0.2168	0.215
0.900	0.121	0.120	0.115	0.078	0.1126	0.1160	0.1171	0.1183	0.114
1.000	-0.079	-0.085	-0.099	-0.159	-0.0588	-0.0596	-0.0597	-0.0612	-0.067

M = 0.7

α	3.0	3.5	4.0	4.5	5.0	6.0	7.0
c_L	0.636	0.714	0.848	0.942	1.047	1.248	1.27
c_M	-0.088	-0.085	-0.085	-0.087	-0.095	-0.130	-0.138
c_D	0.0179	0.022	0.0309	0.038	0.052		

M = 0.705

α	6.0
c_L	1.25
c_M	-0.141

c_p

x/c								
Upper surface								
0.000	0.8365	0.823	0.7204	0.712	0.661	0.578	0.512	0.608
0.005	-0.8279	-0.899	-1.0201	-1.086	-1.150	-1.252	-1.327	-1.202
0.010	-1.2611	-1.346	-1.4783	-1.549	-1.608	-1.692	-1.749	-1.643
0.015	-1.6922	-1.788	-1.8590	-1.933	-1.988	-2.065	-2.120	-2.013
0.020	-1.8358	-1.885	-1.9732	-2.011	-2.058	-2.126	-2.199	-2.068
0.030	-1.8795	-1.925	-2.0027	-2.045	-2.101	-2.182	-2.239	-2.129
0.050	-1.8077	-1.859	-1.9585	-2.004	-2.056	-2.140	-2.196	-2.086
0.075	-1.7073	-1.768	-1.8700	-1.922	-1.980	-2.068	-2.133	-2.017
0.100	-1.6339	-1.702	-1.8182	-1.863	-1.921	-2.013	-2.079	-1.964
0.150	-1.4580	-1.598	-1.7065	-1.770	-1.833	-1.930	-1.998	-1.884
0.200	-0.4891	-1.428	-1.6467	-1.709	-1.770	-1.866	-1.935	-1.821
0.250	-0.5518	-0.462	-1.5899	-1.681	-1.751	-1.840	-1.909	-1.798
0.320	-0.5737	-0.519	-0.6834	-1.654	-1.722	-1.818	-1.887	-1.779
0.380	-0.5589	-0.535	-0.4755	-0.652	-1.377	-1.787	-1.436	-1.747
0.440	-0.5665	-0.554	-0.5017	-0.492	-0.797	-1.430	-1.080	-1.696
0.500	-0.5261	-0.523	-0.5012	-0.436	-0.634	-1.027	-1.023	-0.983
0.560	-0.4992	-0.502	-0.4937	-0.452	-0.444	-0.894	-0.946	-0.912
0.620	-0.4736	-0.482	-0.4793	-0.452	-0.409	-0.732	-0.816	-0.792
0.680	-0.4530	-0.433	-0.4645	-0.424	-0.388	-0.627	-0.740	-0.705
0.740	-0.4000	-0.385	-0.4139	-0.384	-0.367	-0.456	-0.614	-0.559
0.800	-0.3752	-0.355	-0.3903	-0.360	-0.350	-0.353	-0.496	-0.423
0.850	-0.3360	-0.344	-0.3693	-0.351	-0.342	-0.295	-0.414	-0.340
0.900	-0.2796	-0.323	-0.2928	-0.332	-0.326	-0.277	-0.352	-0.276
0.950	-0.1938	-0.193	-0.2066	-0.204	-0.208	-0.199	-0.283	-0.210
0.980	-0.1192	-0.139	-0.1323	-0.153	-0.159	-0.172	-0.253	-0.179
1.000	-0.0674	-0.072	-0.0727	-0.079	-0.086	-0.113	-0.228	-0.149
Lower surface								
0.000	0.8365	0.823	0.7204	0.712	0.661	0.578	0.51247	0.608
0.005	1.0055	1.030	1.0646	1.081	1.094	1.113	1.12304	1.111
0.010	0.7813	0.820	0.8825	0.912	0.944	0.992	1.02322	0.982
0.020	0.5656	0.609	0.6761	0.712	0.749	0.811	0.84921	0.797
0.050	0.1404	0.180	0.2683	0.301	0.345	0.419	0.46906	0.404
0.100	-0.1171	-0.060	0.0029	0.051	0.093	0.160	0.20647	0.147
0.150	-0.1942	-0.167	-0.0887	-0.065	-0.025	0.036	0.07415	0.023
0.200	-0.2603	-0.207	-0.1635	-0.115	-0.081	-0.026	0.00000	-0.043
0.280	-0.2683	-0.235	-0.1885	-0.159	-0.130	-0.088	-0.06835	-0.101
0.360	-0.2956	-0.265	-0.2273	-0.200	-0.177	-0.141	-0.13131	-0.155
0.440	-0.2754	-0.252	-0.2201	-0.199	-0.182	-0.156	-0.15518	-0.169
0.520	-0.1815	-0.161	-0.1416	-0.123	-0.110	-0.095	-0.10374	-0.107
0.600	0.0126	0.026	0.0401	0.053	0.061	0.070	0.05767	0.061
0.680	0.1358	0.148	0.1569	0.168	0.173	0.177	0.16029	0.170
0.740	0.2151	0.221	0.2332	0.237	0.242	0.243	0.22586	0.237
0.800	0.2755	0.281	0.2912	0.296	0.300	0.299	0.28073	0.293
0.850	0.2903	0.295	0.3043	0.307	0.310	0.307	0.27991	0.300
0.900	0.2869	0.289	0.2976	0.299	0.300	0.295	0.26546	0.289
0.950	0.2240	0.226	0.2310	0.232	0.233	0.224	0.17760	0.214
0.980	0.1210	0.120	0.1235	0.123	0.122	0.107	0.04201	0.089
1.000	-0.0674	-0.072	-0.0727	-0.079	-0.086	-0.113	-0.22839	-0.149

Table 3 (continued)

	M = 0.71			M = 0.72					
α	5.0	6.0	7.0	2.5	3.5	4.5	5.0	6.0	7.0
C_L	1.113	1.245	1.25	0.529	0.745	1.039	1.158	1.203	1.222
C_M	-0.115	-0.145	-0.150	-0.092	-0.088	-0.115	-0.142	-0.152	-0.157
C_D				0.015	0.024	0.051			
				C_p					
x/c									
Upper surface									
0.000	0.691	0.621	0.560	0.947	0.858	0.767	0.730	0.669	0.607
0.005	-1.084	-1.175	-1.240	-0.608	-0.793	-0.953	-1.013	-1.088	-1.158
0.010	-1.534	-1.613	-1.665	-0.899	-1.225	-1.403	-1.459	-1.524	-1.582
0.015	-1.909	-1.984	-2.028	-1.512	-1.659	-1.780	-1.829	-1.889	-1.942
0.020	-1.982	-2.036	-2.103	-1.637	-1.754	-1.861	-1.906	-1.950	-2.009
0.030	-2.021	-2.097	-2.145	-1.655	-1.796	-1.895	-1.941	-2.002	-2.058
0.050	-1.979	-2.058	-2.108	-1.569	-1.740	-1.859	-1.903	-1.965	-2.020
0.075	-1.907	-1.988	-2.045	-1.481	-1.659	-1.784	-1.834	-1.897	-1.959
0.100	-1.852	-1.936	-1.994	-1.411	-1.603	-1.732	-1.781	-1.848	-1.911
0.150	-1.770	-1.857	-1.918	-0.868	-1.528	-1.653	-1.704	-1.774	-1.840
0.200	-1.710	-1.795	-1.857	-0.461	-1.456	-1.599	-1.646	-1.716	-1.782
0.260	-1.692	-1.773	-1.832	-0.549	-1.427	-1.585	-1.633	-1.696	-1.760
0.320	-1.670	-1.754	-1.812	-0.565	-0.612	-1.570	-1.619	-1.679	-1.743
0.380	-1.635	-1.724	-1.489	-0.542	-0.434	-1.531	-1.584	-1.640	-1.490
0.440	-1.627	-1.655	-1.114	-0.547	-0.423	-1.535	-1.588	-1.586	-1.176
0.500	-0.822	-0.969	-1.001	-0.508	-0.484	-0.862	-1.440	-0.961	-0.968
0.560	-0.693	-0.909	-0.922	-0.487	-0.485	-0.650	-0.861	-0.868	-0.896
0.620	-0.521	-0.807	-0.841	-0.463	-0.473	-0.513	-0.743	-0.797	-0.834
0.680	-0.409	-0.730	-0.774	-0.420	-0.436	-0.401	-0.651	-0.741	-0.782
0.740	-0.338	-0.598	-0.675	-0.373	-0.390	-0.336	-0.467	-0.646	-0.711
0.800	-0.319	-0.469	-0.578	-0.344	-0.361	-0.319	-0.359	-0.539	-0.629
0.850	-0.308	-0.381	-0.512	-0.335	-0.352	-0.310	-0.291	-0.465	-0.570
0.900	-0.307	-0.295	-0.421	-0.317	-0.332	-0.306	-0.275	-0.359	-0.486
0.950	-0.204	-0.233	-0.371	-0.184	-0.198	-0.199	-0.195	-0.303	-0.436
0.980	-0.157	-0.189	-0.296	-0.131	-0.143	-0.150	-0.154	-0.226	-0.349
1.000	-0.084	-0.177	-0.303	-0.066	-0.071	-0.078	-0.089	-0.237	-0.355
Lower surface									
0.000	0.691	0.621	0.560	0.947	0.858	0.767	0.730	0.669	0.607
0.005	1.093	1.111	1.121	0.953	1.027	1.075	1.091	1.107	1.120
0.010	0.936	0.979	1.013	0.695	0.813	0.898	0.922	0.968	1.000
0.020	0.742	0.794	0.834	0.481	0.604	0.698	0.732	0.778	0.819
0.050	0.336	0.400	0.450	0.035	0.175	0.285	0.324	0.380	0.430
0.100	0.083	0.143	0.188	-0.201	-0.069	0.034	0.070	0.120	0.164
0.150	-0.055	0.014	0.056	-0.295	-0.176	-0.081	-0.048	-0.005	0.035
0.200	-0.088	-0.046	-0.018	-0.325	-0.218	-0.132	-0.103	-0.068	-0.043
0.280	-0.139	-0.109	-0.087	-0.333	-0.246	-0.175	-0.157	-0.129	-0.111
0.360	-0.185	-0.163	-0.151	-0.352	-0.277	-0.217	-0.200	-0.185	-0.179
0.440	-0.189	-0.177	-0.178	-0.321	-0.262	-0.214	-0.202	-0.200	-0.203
0.520	-0.116	-0.114	-0.122	-0.209	-0.167	-0.134	-0.126	-0.133	-0.148
0.600	0.061	0.057	0.044	-0.002	0.026	0.049	0.052	0.042	0.026
0.680	0.173	0.164	0.148	0.129	0.150	0.167	0.169	0.153	0.133
0.740	0.241	0.231	0.213	0.205	0.224	0.238	0.240	0.220	0.199
0.800	0.300	0.289	0.267	0.268	0.286	0.297	0.298	0.276	0.253
0.850	0.305	0.294	0.269	0.284	0.300	0.309	0.309	0.281	0.254
0.900	0.301	0.283	0.253	0.282	0.294	0.301	0.300	0.270	0.236
0.950	0.235	0.206	0.156	0.220	0.231	0.235	0.232	0.183	0.131
0.980	0.122	0.073	0.001	0.117	0.124	0.125	0.121	0.040	-0.035
1.000	-0.084	-0.177	-0.303	-0.066	-0.071	-0.078	-0.089	-0.237	-0.355

	M = 0.725						M = 0.73		
α	1.5	1.75	2.0	3.0	4.0	5.0	4.5	5.0	6.0
C_L	0.377	0.435	0.472	0.670	0.948	1.149	1.091	1.140	1.166
C_M	-0.095	-0.093	-0.095	-0.091	-0.105	-0.151	-0.144	-0.155	-0.157
C_D	0.0117	0.0123	0.0129	0.0196	0.0414				
					C_p				
x/c									
Upper surface									
0.000	1.0164	0.9940	0.9694	0.8813	0.784	0.756	0.799	0.768	0.709
0.005	-0.4067	-0.4611	-0.5130	-0.7054	-0.870	-0.965	-0.880	-0.936	-1.011
0.010	-0.6586	-0.7127	-0.7715	-1.1004	-1.305	-1.408	-1.323	-1.376	-1.443
0.015	-1.3302	-1.3724	-1.4093	-1.5366	-1.682	-1.776	-1.702	-1.745	-1.806
0.020	-1.4591	-1.5065	-1.5507	-1.6780	-1.793	-1.854	-1.786	-1.822	-1.873
0.030	-1.4561	-1.5213	-1.5721	-1.7221	-1.828	-1.888	-1.818	-1.856	-1.918
0.050	-1.2470	-1.3784	-1.4711	-1.6649	-1.790	-1.853	-1.783	-1.824	-1.883
0.075	-1.1654	-1.2403	-1.3772	-1.5779	-1.710	-1.784	-1.711	-1.754	-1.818
0.100	-0.4266	-1.0930	-1.3020	-1.5222	-1.664	-1.735	-1.663	-1.707	-1.770
0.150	-0.5341	-0.5108	-0.4516	-1.4547	-1.589	-1.659	-1.587	-1.634	-1.699
0.200	-0.5500	-0.5589	-0.5297	-1.3769	-1.526	-1.607	-1.537	-1.583	-1.643
0.260	-0.5381	-0.5609	-0.5709	-0.7849	-1.500	-1.595	-1.528	-1.570	-1.629
0.320	-0.5238	-0.5464	-0.5622	-0.4704	-1.479	-1.582	-1.514	-1.558	-1.612
0.380	-0.4936	-0.5148	-0.5333	-0.4819	-1.473	-1.548	-1.481	-1.526	-1.573
0.440	-0.4988	-0.5192	-0.5384	-0.5288	-1.213	-1.553	-1.487	-1.534	-1.558
0.500	-0.4651	-0.4831	-0.5000	-0.5193	-0.644	-1.410	-1.347	-1.393	-1.015
0.560	-0.4468	-0.4623	-0.4773	-0.5058	-0.506	-0.917	-1.136	-0.901	-0.833
0.620	-0.4274	-0.4406	-0.4543	-0.4847	-0.428	-0.781	-0.720	-0.783	-0.782
0.680	-0.4147	-0.4266	-0.4381	-0.4676	-0.390	-0.707	-0.617	-0.721	-0.740
0.740	-0.3702	-0.3789	-0.3881	-0.4155	-0.372	-0.568	-0.447	-0.618	-0.668
0.800	-0.3524	-0.3600	-0.3674	-0.3900	-0.357	-0.441	-0.350	-0.498	-0.586
0.850	-0.3182	-0.3235	-0.3297	-0.3482	-0.328	-0.343	-0.287	-0.401	-0.519
0.900	-0.2662	-0.2698	-0.2749	-0.2893	-0.281	-0.271	-0.277	-0.288	-0.422
0.950	-0.1808	-0.1819	-0.1868	-0.1985	-0.203	-0.195	-0.190	-0.211	-0.380
0.980	-0.1077	-0.1092	-0.1117	-0.1220	-0.129	-0.158	-0.146	-0.167	-0.275
1.000	-0.0584	-0.0594	-0.0608	-0.0653	-0.071	-0.110	-0.079	-0.141	-0.293
Lower surface									
0.000	1.0164	0.9940	0.9694	0.8813	0.784	0.756	0.799	0.768	0.709
0.005	0.8588	0.8886	0.9161	1.0023	1.059	1.084	1.069	1.084	1.103
0.010	0.5651	0.6069	0.6454	0.7736	0.866	0.916	0.886	0.911	0.949
0.020	0.3484	0.3874	0.4274	0.5599	0.661	0.717	0.686	0.710	0.760
0.050	-0.0990	-0.0570	-0.0119	0.1352	0.252	0.308	0.270	0.301	0.358
0.100	-0.3547	-0.3131	-0.2694	-0.1259	-0.014	0.057	0.019	0.049	0.098
0.150	-0.4063	-0.3700	-0.3321	-0.2048	-0.104	-0.061	-0.095	-0.070	-0.028
0.200	-0.4548	-0.4222	-0.3885	-0.2733	-0.180	-0.117	-0.146	-0.126	-0.092
0.280	-0.4298	-0.4025	-0.3762	-0.2817	-0.204	-0.165	-0.189	-0.176	-0.152
0.360	-0.4337	-0.4125	-0.3897	-0.3100	-0.245	-0.212	-0.232	-0.220	-0.211
0.440	-0.3821	-0.3664	-0.3496	-0.2865	-0.235	-0.214	-0.228	-0.223	-0.226
0.520	-0.2527	-0.2417	-0.2309	-0.1865	-0.150	-0.136	-0.144	-0.144	-0.155
0.600	-0.0314	-0.0245	-0.0167	0.0147	0.039	0.046	0.043	0.040	0.026
0.680	0.1062	0.1109	0.1173	0.1412	0.158	0.162	0.163	0.158	0.138
0.740	0.1898	0.1942	0.2001	0.2207	0.236	0.235	0.236	0.229	0.207
0.800	0.2539	0.2577	0.2635	0.2810	0.294	0.293	0.296	0.287	0.263
0.850	0.2731	0.2767	0.2810	0.2962	0.307	0.304	0.308	0.299	0.268
0.900	0.2758	0.2783	0.2818	0.2934	0.302	0.295	0.300	0.289	0.255
0.950	0.2173	0.2191	0.2212	0.2305	0.236	0.225	0.234	0.216	0.160
0.980	0.1209	0.1205	0.1217	0.1260	0.128	0.109	0.125	0.095	0.010
1.000	-0.0584	-0.0594	-0.0608	-0.0653	-0.071	-0.110	-0.079	-0.141	-0.293

Table 3 (continued)

M = 0.735 — M = 0.74

α	4.5	2.5	3.5	4.0	4.5	5.0	6.0	7.0
C_L	1.09	0.567	0.844	1.002	1.084	1.089	1.132	0.171
C_M	-0.427	-0.094	-0.105	-0.138	-0.159	-0.156	-0.162	-0.169
C_D		0.016	0.032	0.049				

C_p

x/c								
Upper surface								
0.000	0.816	0.974	0.896	0.863	0.831	0.805	0.747	0.693
0.005	-0.845	-0.524	-0.684	-0.749	-0.805	-0.856	-0.939	-1.005
0.010	-1.281	-0.800	-1.104	-1.169	-1.237	-1.291	-1.366	-1.427
0.015	-1.664	-1.403	-1.524	-1.578	-1.675	-1.661	-1.726	-1.780
0.020	-1.749	-1.525	-1.627	-1.669	-1.708	-1.743	-1.800	-1.839
0.030	-1.784	-1.545	-1.669	-1.709	-1.745	-1.776	-1.839	-1.894
0.050	-1.744	-1.471	-1.620	-1.665	-1.704	-1.742	-1.808	-1.860
0.075	-1.676	-1.397	-1.546	-1.594	-1.638	-1.678	-1.745	-1.802
0.100	-1.630	-1.340	-1.496	-1.548	-1.593	-1.631	-1.699	-1.759
0.150	-1.556	-1.267	-1.437	-1.478	-1.522	-1.562	-1.631	-1.694
0.200	-1.508	-1.183	-1.374	-1.428	-1.475	-1.513	-1.582	-1.643
0.260	-1.499	-0.444	-1.362	-1.421	-1.468	-1.506	-1.569	-1.626
0.320	-1.486	-0.484	-1.347	-1.405	-1.453	-1.494	-1.553	-1.610
0.380	-1.457	-0.516	-1.324	-1.384	-1.428	-1.467	-1.527	-1.516
0.440	-1.461	-0.548	-1.322	-1.370	-1.434	-1.474	-1.528	-1.483
0.500	-1.324	-0.523	-0.571	-1.254	-1.300	-1.338	-1.111	-0.971
0.560	-1.332	-0.507	-0.436	-1.251	-1.311	-0.831	-0.802	-0.843
0.620	-0.772	-0.482	-0.391	-0.642	-0.829	-0.746	-0.771	-0.814
0.680	-0.667	-0.439	-0.381	-0.512	-0.698	-0.695	-0.727	-0.774
0.740	-0.511	-0.389	-0.362	-0.391	-0.568	-0.633	-0.681	-0.735
0.800	-0.410	-0.356	-0.343	-0.316	-0.481	-0.542	-0.614	-0.685
0.850	-0.317	-0.348	-0.339	-0.290	-0.372	-0.468	-0.563	-0.651
0.900	-0.271	-0.329	-0.327	-0.285	-0.279	-0.344	-0.469	-0.575
0.950	-0.191	-0.190	-0.195	-0.188	-0.195	-0.286	-0.442	-0.556
0.980	-0.147	-0.134	-0.140	-0.138	-0.154	-0.198	-0.326	-0.454
1.000	-0.086	-0.067	-0.071	-0.073	-0.111	-0.210	-0.343	-0.452
Lower surface								
0.000	0.816	0.974	0.896	0.863	0.831	0.805	0.747	0.693
0.005	1.066	0.952	1.022	1.046	1.063	1.077	1.099	1.116
0.010	0.878	0.691	0.802	0.837	0.871	0.895	0.939	0.978
0.020	0.676	0.479	0.594	0.637	0.669	0.697	0.744	0.788
0.050	0.258	0.032	0.164	0.213	0.251	0.282	0.335	0.388
0.100	0.010	-0.211	-0.082	-0.035	-0.001	0.027	0.076	0.122
0.150	-0.105	-0.308	-0.190	-0.148	-0.116	-0.097	-0.051	-0.009
0.200	-0.157	-0.340	-0.233	-0.195	-0.167	-0.150	-0.115	-0.085
0.280	-0.200	-0.350	-0.261	-0.228	-0.211	-0.197	-0.177	-0.157
0.360	-0.243	-0.370	-0.294	-0.268	-0.254	-0.249	-0.238	-0.227
0.440	-0.238	-0.335	-0.276	-0.256	-0.250	-0.248	-0.251	-0.254
0.520	-0.151	-0.215	-0.174	-0.161	-0.161	-0.169	-0.179	-0.190
0.600	0.038	-0.001	0.025	0.034	0.032	0.024	0.011	-0.004
0.680	0.160	0.151	0.152	0.159	0.154	0.144	0.125	0.108
0.740	0.232	0.208	0.227	0.232	0.228	0.213	0.195	0.177
0.800	0.292	0.272	0.288	0.294	0.288	0.277	0.252	0.234
0.850	0.305	0.288	0.303	0.307	0.300	0.284	0.256	0.234
0.900	0.296	0.286	0.298	0.300	0.290	0.273	0.241	0.213
0.950	0.229	0.225	0.234	0.237	0.221	0.192	0.145	0.105
0.980	0.119	0.122	0.128	0.128	0.106	0.056	-0.014	-0.070
1.000	-0.086	-0.067	-0.071	-0.073	-0.111	-0.210	-0.343	-0.452

M = 0.75

α	1.0	1.5	1.75	2.0	3.0	3.5	4.0	4.5	5.0	6.0
C_L	0.303	0.400	0.433	0.499	0.765	0.894	0.997	1.037	1.041	1.093
C_M	-0.098	-0.099	-0.100	-0.098	-0.105	-0.127	-0.150	-0.161	-0.156	-0.164
C_D	0.0125	0.0120	0.0125	0.0134	0.0255	0.039	0.0363			

C_p

x/c										
Upper surface										
0.000	1.073	1.041	1.021	1.000	0.926	0.917	0.862	0.864	0.839	0.785
0.005	-0.228	-0.319	-0.368	-0.413	-0.578	-0.627	-0.696	-0.729	-0.780	-0.863
0.010	-0.478	-0.567	-0.614	-0.663	-0.906	-1.035	-1.103	-1.143	-1.207	-1.288
0.015	-1.132	-1.211	-1.248	-1.282	-1.387	-1.455	-1.488	-1.543	-1.587	-1.645
0.020	-1.260	-1.338	-1.380	-1.418	-1.530	-1.561	-1.610	-1.632	-1.668	-1.720
0.030	-1.219	-1.351	-1.398	-1.442	-1.569	-1.604	-1.649	-1.670	-1.704	-1.755
0.050	-1.016	-1.246	-1.305	-1.358	-1.520	-1.556	-1.612	-1.630	-1.668	-1.728
0.075	-0.879	-1.158	-1.228	-1.285	-1.442	-1.485	-1.539	-1.563	-1.604	-1.666
0.100	-0.443	-1.079	-1.167	-1.229	-1.398	-1.438	-1.493	-1.521	-1.563	-1.624
0.150	-0.501	-0.448	-0.523	-1.144	-1.346	-1.382	-1.444	-1.454	-1.496	-1.560
0.200	-0.521	-0.526	-0.460	-0.643	-1.286	-1.323	-1.386	-1.409	-1.449	-1.515
0.260	-0.511	-0.557	-0.549	-0.480	-1.257	-1.316	-1.366	-1.405	-1.447	-1.507
0.320	-0.501	-0.547	-0.558	-0.550	-1.238	-1.305	-1.349	-1.389	-1.433	-1.494
0.380	-0.478	-0.524	-0.543	-0.544	-1.140	-1.288	-1.352	-1.372	-1.415	-1.474
0.440	-0.490	-0.535	-0.556	-0.567	-1.064	-1.208	-1.301	-1.326	-1.422	-1.478
0.500	-0.459	-0.498	-0.517	-0.551	-0.520	-1.168	-1.218	-1.250	-1.292	-1.227
0.560	-0.445	-0.478	-0.495	-0.509	-0.435	-1.063	-1.229	-1.263	-0.801	-0.770
0.620	-0.427	-0.455	-0.470	-0.481	-0.414	-0.528	-0.979	-0.804	-0.719	-0.752
0.680	-0.416	-0.440	-0.453	-0.462	-0.422	-0.419	-0.623	-0.671	-0.669	-0.711
0.740	-0.371	-0.390	-0.401	-0.409	-0.398	-0.354	-0.508	-0.599	-0.628	-0.674
0.800	-0.356	-0.371	-0.379	-0.385	-0.380	-0.314	-0.413	-0.535	-0.565	-0.627
0.850	-0.321	-0.332	-0.339	-0.343	-0.344	-0.308	-0.330	-0.451	-0.506	-0.584
0.900	-0.268	-0.275	-0.280	-0.283	-0.288	-0.300	-0.261	-0.326	-0.403	-0.501
0.950	-0.179	-0.184	-0.186	-0.189	-0.197	-0.187	-0.185	-0.241	-0.357	-0.489
0.980	-0.104	-0.107	-0.110	-0.111	-0.120	-0.136	-0.140	-0.194	-0.249	-0.378
1.000	-0.055	-0.057	-0.059	-0.060	-0.065	-0.069	-0.106	-0.183	-0.268	-0.386
Lower surface										
0.000	1.073	1.041	1.021	1.000	0.926	0.917	0.862	0.864	0.839	0.785
0.005	0.799	0.899	0.886	0.914	0.994	1.016	1.040	1.055	1.070	1.093
0.010	0.486	0.564	0.605	0.641	0.759	0.792	0.833	0.854	0.881	0.925
0.020	0.271	0.351	0.388	0.426	0.546	0.584	0.625	0.651	0.680	0.728
0.050	-0.183	-0.096	-0.059	-0.015	0.121	0.153	0.212	0.230	0.259	0.317
0.100	-0.463	-0.370	-0.326	-0.281	-0.145	-0.093	-0.059	-0.024	0.003	0.056
0.150	-0.514	-0.428	-0.391	-0.349	-0.226	-0.203	-0.149	-0.140	-0.118	-0.070
0.200	-0.564	-0.485	-0.451	-0.411	-0.296	-0.248	-0.228	-0.194	-0.174	-0.136
0.280	-0.519	-0.458	-0.432	-0.400	-0.306	-0.274	-0.251	-0.252	-0.224	-0.200
0.360	-0.514	-0.465	-0.442	-0.415	-0.336	-0.308	-0.294	-0.283	-0.277	-0.265
0.440	-0.434	-0.403	-0.388	-0.368	-0.309	-0.288	-0.281	-0.277	-0.278	-0.278
0.520	-0.280	-0.259	-0.250	-0.237	-0.198	-0.182	-0.184	-0.182	-0.190	-0.199
0.600	-0.047	-0.030	-0.024	-0.015	0.011	0.022	0.017	0.016	0.010	-0.004
0.680	0.095	0.109	0.113	0.121	0.141	0.152	0.143	0.141	0.130	0.114
0.740	0.181	0.193	0.197	0.205	0.222	0.226	0.223	0.215	0.198	0.184
0.800	0.245	0.257	0.262	0.267	0.284	0.289	0.283	0.275	0.262	0.243
0.850	0.267	0.278	0.281	0.286	0.300	0.304	0.296	0.286	0.270	0.246
0.900	0.272	0.280	0.282	0.288	0.298	0.299	0.289	0.276	0.259	0.230
0.950	0.218	0.222	0.225	0.227	0.234	0.235	0.217	0.197	0.172	0.127
0.980	0.121	0.124	0.125	0.126	0.129	0.127	0.104	0.066	0.023	-0.034
1.000	-0.055	-0.057	-0.059	-0.060	-0.065	-0.069	-0.106	-0.183	-0.268	-0.386

Table 3 (continued)

M = 0.76

α	2.0	2.5	3.5	4.0	4.5	5.0	6.0	7.0
C_L	0.511	0.612	0.915	0.975	0.984	0.993	1.050	1.11
C_M	-0.100	-0.098	-0.150	-0.163	-0.159	-0.156	-0.164	-0.177
C_D	0.0139	0.0184	0.0302	0.0388				

C_p

x/c								
Upper surface								
0.000	1.013	1.000	0.941	0.917	0.895	0.869	0.820	0.763
0.005	-0.373	-0.439	-0.565	-0.615	-0.658	-0.706	-0.790	-0.869
0.010	-0.619	-0.697	-0.947	-1.021	-1.061	-1.118	-1.208	-1.283
0.015	-1.230	-1.300	-1.383	-1.427	-1.465	-1.508	-1.565	-1.629
0.020	-1.363	-1.417	-1.495	-1.527	-1.557	-1.593	-1.645	-1.702
0.030	-1.388	-1.437	-1.536	-1.569	-1.597	-1.629	-1.678	-1.743
0.050	-1.310	-1.370	-1.489	-1.524	-1.561	-1.596	-1.652	-1.714
0.075	-1.241	-1.306	-1.421	-1.459	-1.493	-1.533	-1.593	-1.660
0.100	-1.191	-1.258	-1.375	-1.416	-1.452	-1.492	-1.552	-1.620
0.150	-1.121	-1.201	-1.326	-1.365	-1.396	-1.431	-1.491	-1.562
0.200	-1.060	-1.137	-1.269	-1.310	-1.348	-1.389	-1.450	-1.518
0.260	-0.485	-1.137	-1.262	-1.306	-1.345	-1.383	-1.445	-1.508
0.320	-0.461	-1.119	-1.255	-1.295	-1.330	-1.371	-1.430	-1.489
0.380	-0.517	-0.498	-1.235	-1.285	-1.321	-1.360	-1.415	-1.484
0.440	-0.566	-0.438	-1.161	-1.255	-1.322	-1.365	-1.428	-1.486
0.500	-0.542	-0.468	-1.130	-1.167	-1.204	-1.242	-1.280	-1.304
0.560	-0.523	-0.485	-1.148	-1.188	-1.219	-0.822	-0.736	-0.811
0.620	-0.495	-0.478	-1.193	-1.236	-0.790	-0.699	-0.736	-0.802
0.680	-0.475	-0.445	-0.608	-0.754	-0.635	-0.640	-0.688	-0.761
0.740	-0.419	-0.399	-0.454	-0.559	-0.581	-0.613	-0.660	-0.739
0.800	-0.393	-0.365	-0.348	-0.440	-0.539	-0.575	-0.635	-0.714
0.850	-0.350	-0.357	-0.304	-0.366	-0.475	-0.527	-0.600	-0.685
0.900	-0.287	-0.338	-0.268	-0.291	-0.378	-0.444	-0.527	-0.628
0.950	-0.191	-0.193	-0.177	-0.211	-0.308	-0.406	-0.528	-0.638
0.980	-0.111	-0.135	-0.131	-0.175	-0.247	-0.299	-0.409	-0.540
1.000	-0.059	-0.067	-0.075	-0.134	-0.244	-0.313	-0.423	-0.529
Lower surface								
0.000	1.013	1.000	0.941	0.917	0.895	0.869	0.820	0.763
0.005	0.912	0.947	1.008	1.028	1.044	1.059	1.087	1.107
0.010	0.638	0.684	0.778	0.808	0.836	0.864	0.912	0.952
0.020	0.425	0.475	0.570	0.603	0.632	0.659	0.713	0.758
0.050	-0.015	0.026	0.138	0.173	0.205	0.234	0.297	0.353
0.100	-0.288	-0.224	-0.113	-0.079	-0.050	-0.018	0.038	0.084
0.150	-0.358	-0.324	-0.221	-0.192	-0.165	-0.140	-0.090	-0.048
0.200	-0.423	-0.361	-0.266	-0.243	-0.222	-0.199	-0.156	-0.127
0.280	-0.413	-0.370	-0.295	-0.278	-0.266	-0.250	-0.221	-0.203
0.360	-0.429	-0.393	-0.329	-0.320	-0.316	-0.307	-0.287	-0.279
0.440	-0.378	-0.353	-0.307	-0.304	-0.308	-0.307	-0.303	-0.307
0.520	-0.240	-0.223	-0.194	-0.198	-0.206	-0.212	-0.219	-0.234
0.600	-0.015	-0.002	0.014	0.008	0.000	-0.008	-0.016	-0.034
0.680	0.122	0.133	0.144	0.138	0.125	0.118	0.101	0.085
0.740	0.206	0.211	0.223	0.214	0.203	0.191	0.177	0.153
0.800	0.269	0.275	0.285	0.276	0.263	0.252	0.236	0.216
0.850	0.288	0.292	0.300	0.290	0.272	0.259	0.236	0.217
0.900	0.289	0.291	0.294	0.280	0.260	0.245	0.222	0.194
0.950	0.230	0.229	0.231	0.209	0.176	0.154	0.121	0.085
0.980	0.128	0.125	0.123	0.090	0.034	-0.001	-0.050	-0.099
1.000	-0.059	-0.067	-0.075	-0.134	-0.244	-0.313	-0.423	-0.529

M = 0.77

α	1.75	2.0	2.5	3.5	4.5	6.0
C_L	0.479	0.535	0.648	0.897	0.957	1.004
C_M	-0.101	-0.102	-0.106	-0.161	-0.164	-0.163
C_D	0.0130	0.0144	0.021			

C_p

x/c						
Upper surface						
0.000	1.042	1.024	1.013	0.965	0.921	0.850
0.005	-0.295	-0.338	-0.398	-0.501	-0.593	-0.724
0.010	-0.536	-0.579	-0.654	-0.827	-0.993	-1.136
0.015	-1.154	-1.185	-1.252	-1.315	-1.395	-1.496
0.020	-1.282	-1.316	-1.367	-1.431	-1.490	-1.578
0.030	-1.302	-1.341	-1.388	-1.466	-1.533	-1.612
0.050	-1.219	-1.266	-1.319	-1.419	-1.493	-1.585
0.075	-1.153	-1.203	-1.262	-1.356	-1.430	-1.529
0.100	-1.095	-1.155	-1.217	-1.310	-1.391	-1.491
0.150	-1.037	-1.094	-1.165	-1.268	-1.346	-1.434
0.200	-0.975	-1.040	-1.108	-1.212	-1.291	-1.394
0.260	-0.441	-1.033	-1.112	-1.210	-1.291	-1.393
0.320	-0.489	-0.575	-1.102	-1.204	-1.277	-1.378
0.380	-0.540	-0.457	-0.943	-1.175	-1.274	-1.365
0.440	-0.587	-0.520	-0.928	-1.106	-1.270	-1.381
0.500	-0.551	-0.535	-0.533	-1.087	-1.161	-1.263
0.560	-0.531	-0.530	-0.420	-1.105	-1.180	-0.743
0.620	-0.497	-0.504	-0.416	-1.153	-1.214	-0.731
0.680	-0.478	-0.485	-0.413	-1.013	-0.633	-0.677
0.740	-0.419	-0.427	-0.386	-0.550	-0.553	-0.653
0.800	-0.394	-0.399	-0.356	-0.403	-0.493	-0.647
0.850	-0.349	-0.353	-0.352	-0.334	-0.450	-0.614
0.900	-0.286	-0.289	-0.334	-0.268	-0.387	-0.561
0.950	-0.187	-0.190	-0.190	-0.187	-0.350	-0.569
0.980	-0.108	-0.110	-0.132	-0.149	-0.312	-0.467
1.000	-0.059	-0.058	-0.066	-0.108	-0.287	-0.469
Lower surface						
0.000	1.042	1.024	1.013	0.965	0.921	0.850
0.005	0.885	0.912	0.946	0.999	1.035	1.079
0.010	0.600	0.637	0.681	0.762	0.820	0.895
0.020	0.398	0.426	0.472	0.554	0.615	0.695
0.050	-0.055	-0.014	0.024	0.118	0.186	0.277
0.100	-0.339	-0.294	-0.230	-0.136	-0.074	0.012
0.150		-0.366	-0.331	-0.246	-0.192	-0.118
0.200	-0.477	-0.436	-0.371	-0.294	-0.249	-0.186
0.280	-0.459	-0.425	-0.381	-0.321	-0.294	-0.252
0.360	-0.472	-0.445	-0.405	-0.359	-0.347	-1.325
0.440	-0.407	-0.387	-0.362	-0.334	-0.340	-1.341
0.520	-0.254	-0.242	-0.225	-0.213	-0.230	-0.249
0.600	-0.024	-0.013	-0.002	0.003	-0.015	-0.034
0.680	0.117	0.124	0.134	0.136	0.114	0.090
0.740	0.201	0.208	0.213	0.213	0.191	0.162
0.800	0.265	0.271	0.277	0.277	0.252	0.223
0.850	0.285	0.291	0.295	0.291	0.263	0.227
0.900	0.287	0.293	0.293	0.283	0.248	0.209
0.950	0.228	0.232	0.232	0.217	0.162	0.104
0.980	0.128	0.130	0.128	0.104	0.017	-0.071
1.000	-0.059	-0.058	-0.066	-0.108	-0.287	-0.469

Table 3 (continued)

M = 0.775

α	1.0	1.5	1.75	2.0	3.0	4.0
C_L	0.393	0.415	0.483	0.549	0.813	0.892
C_M	-0.152	-0.104	-0.103	-0.104	-0.146	-0.158
C_D	0.0125	0.0122	0.0133	0.014	0.0221	

C_p

x/c						
Upper surface						
0.000	1.093	1.064	1.048	1.030	0.977	0.946
0.005	-0.156	-0.236	-0.279	-0.317	-0.436	-0.517
0.010	-0.402	-0.477	-0.517	-0.558	-0.709	-0.877
0.015	-1.030	-1.100	-1.132	-1.159	-1.239	-1.290
0.020	-1.157	-1.222	-1.259	-1.289	-1.380	-1.420
0.030	-1.143	-1.236	-1.275	-1.314	-1.412	-1.458
0.050	-1.039	-1.150	-1.198	-1.242	-1.363	-1.420
0.075	-0.943	-1.080	-1.134	-1.180	-1.296	-1.354
0.100	-0.802	-1.024	-1.077	-1.128	-1.255	-1.314
0.150	-0.460	-0.954	-0.025	-1.078	-1.211	-1.287
0.200	-0.530	-0.484	-0.969	-1.027	-1.164	-1.230
0.260	-0.539	-0.497	-0.601	-1.024	-1.143	-1.227
0.320	-0.529	-0.543	-0.446	-0.998	-1.136	-1.223
0.380	-0.517	-0.561	-0.518	-0.477	-1.027	-1.207
0.440	-0.536	-0.594	-0.587	-0.471	-1.036	-1.160
0.500	-0.499	-0.546	-0.560	-0.505	-1.033	-1.145
0.560	-0.484	-0.525	-0.542	-0.520	-1.043	-1.129
0.620	-0.460	-0.492	-0.506	-0.503	-1.023	-1.169
0.680	-0.446	-0.473	-0.485	-0.488	-0.881	-0.756
0.740	-0.394	-0.415	-0.425	-0.430	-0.471	-0.533
0.800	-0.375	-0.390	-0.398	-0.403	-0.363	-0.454
0.850	-0.336	-0.347	-0.352	-0.356	-0.300	-0.393
0.900	-0.276	-0.283	-0.287	-0.290	-0.237	-0.361
0.950	-2.007	-0.185	-0.187	-0.189	-0.168	-0.296
0.980	-0.102	-0.105	-0.108	-0.109	-0.118	-0.274
1.000	-0.054	-0.056	-0.058	-0.058	-0.090	-0.260
Lower surface						
0.000	1.093	1.064	1.048	1.030	0.977	0.946
0.005	0.804	0.859	0.886	0.910	0.975	1.007
0.010	0.493	0.564	0.599	0.635	0.729	0.779
0.020	0.284	0.355	0.397	0.425	0.519	0.569
0.050	-0.170	-0.093	-0.055	-0.015	0.092	0.142
0.100	-0.477	-0.386	-0.341	-0.298	-0.186	-0.128
0.150	-0.538	-0.453		-0.371	-0.268	-0.219
0.200	-0.633	-0.529	-0.484	-0.444	-0.344	-0.305
0.280	-0.568	-0.500	-0.466	-0.433	-0.356	-0.335
0.360	-0.564	-0.509	-0.480	-0.452	-0.389	-0.387
0.440	-0.462	-0.430	-0.411	-0.393	-0.353	-0.368
0.520	-0.284	-0.265	-0.255	-0.244	-0.225	-0.247
0.600	-0.045	-0.031	-0.021	-0.014	-0.002	-0.023
0.680	0.099	0.111	0.118	0.124	0.131	0.107
0.740	0.184	0.196	0.202	0.208	0.215	0.191
0.800	0.248	0.260	0.267	0.271	0.276	0.250
0.850	0.271	0.282	0.287	0.291	0.293	0.262
0.900	0.277	0.285	0.289	0.293	0.291	0.250
0.950	0.222	0.228	0.231	0.233	0.224	0.163
0.980	0.126	0.129	0.130	0.131	0.115	0.023
1.000	-0.054	-0.056	-0.058	-0.058	-0.090	-0.260

M = 0.78

α	2.0	2.0	2.1	2.5	3.5	5.0
C_L	0.567	0.568	0.600	0.690	0.853	0.922
C_M	-0.108	-0.108	-0.112	-0.126	-0.162	-0.159
C_D	0.0158			0.016		

M = 0.785

1.75	1.75	2.0
0.513	0.512	0.581
-0.111	-0.106	-0.097
0.0144		0.0119

C_p

x/c									
Upper surface									
0.000	1.038	1.043	1.040	1.029	0.987	0.921	1.056	1.059	1.044
0.005	-0.299	-0.300	-0.312	-0.347	-0.440	-0.578	-0.247	-0.241	-0.278
0.010	-0.538	-0.536	-0.548	-0.595	-0.722	-0.969	-0.479	-0.478	-0.514
0.015	-1.157	-1.133	-1.142	-1.197	-1.256	-1.362	-1.088	-1.085	-1.112
0.020	-1.267	-1.260	-1.268	-1.308	-1.371	-1.455	-1.220	-1.210	-1.240
0.030	-1.291	-1.296	-1.287	-1.326	-1.401	-1.497	-1.233	-1.228	-1.264
0.050	-1.219	-1.203	-1.217	-1.259	-1.353	-1.463	-1.158	-1.153	-1.193
0.075	-1.160	-1.147	-1.160	-1.205	-1.293	-1.400	-1.097	-1.093	-1.135
0.100	-1.108	-1.101	-1.115	-1.163	-1.249	-1.365	-1.040	-1.039	-1.083
0.150	-1.062	-1.060	-1.076	-1.116	-1.207	-1.329	-1.002	-0.996	-1.041
0.200	-1.014	-1.001	-1.017	-1.063	-1.160	-1.293	-0.955	-0.948	-0.997
0.260	-1.015	-1.021	-1.035	-1.071	-1.157	-1.270	-0.953	-0.947	-0.999
0.320	-0.994	-1.006	-1.023	-1.066	-1.153	-1.262	-0.921	-0.911	-0.981
0.380	-0.836	-0.847	-0.875	-0.920	-1.112	-1.258	-0.474	-0.464	-0.836
0.440	-0.672	-0.804	-0.901	-0.958	-1.058	-1.267	-0.499	-0.499	-0.879
0.500	-0.451	-0.455	-0.791	-0.955	-1.044	-1.152	-0.541	-0.537	-0.869
0.560	-0.488	-0.469	-0.432	-0.981	-1.067	-1.161	-0.585	-0.577	-0.443
0.620	-0.486	-0.479	-0.438	-0.738	-1.109	-0.735	-0.528	-0.519	-0.444
0.680	-0.485	-0.483	-0.456	-0.410	-1.034	-0.621	-0.508	-0.498	-0.463
0.740	-0.432	-0.429	-0.419	-0.351	-0.623	-0.586	-0.447	-0.434	-0.424
0.800	-0.404	-0.408	-0.402	-0.323	-0.432	-0.565	-0.418	-0.405	-0.400
0.850	-0.358	-0.361	-0.356	-0.320	-0.359	-0.525	-0.372	-0.357	-0.355
0.900	-0.290	-0.295	-0.293	-0.305	-0.292	-0.484	-0.307	-0.288	-0.288
0.950	-0.190	-0.188	-0.185	-0.180	-0.223	-0.453	-0.210	-0.186	-0.188
0.980	-0.109	-0.116	-0.117	-0.126	-0.196	-0.393	-0.135	-0.106	-0.109
1.000	-0.060	-0.061	-0.062	-0.065	-0.159	-0.386	-0.078	-0.057	-0.059
Lower surface									
0.000	1.038	1.043	1.040	1.029	0.987	0.921	1.056	1.059	1.044
0.005	0.909	0.902	0.910	0.940	0.987	1.045	0.887	0.884	0.906
0.010	0.632	0.625	0.635	0.671	0.744	0.834	0.598	0.598	0.628
0.020	0.424	0.419	0.425	0.464	0.537	0.625	0.391	0.395	0.420
0.050	-0.017	-0.032	-0.020	0.015	0.099	0.201	-0.052	-0.054	-0.021
0.100	-0.303	-0.306	-0.293	-0.245	-0.160	-0.060	-0.338	-0.348	-0.310
0.150	-0.377	-0.380	-0.368	-0.347	-0.273	-0.185	-0.425		
0.200	-0.454	-0.461	-0.447	-0.396	-0.323	-0.248	-0.502	-0.506	-0.476
0.280	-0.443	-0.450	-0.440	-0.402	-0.353	-0.304	-0.488	-0.487	-0.467
0.360	-0.465	-0.474	-0.464	-0.430	-0.397	-0.372	-0.501	-0.506	-0.457
0.440	-0.402	-0.409	-0.402	-0.379	-0.367	-0.369	-0.421	-0.425	-0.480
0.520	-0.247	-0.252	-0.247	-0.233	-0.235	-0.256	-0.256	-0.257	-0.410
0.600	-0.016	-0.019	-0.016	-0.006	-0.011	-0.033	-0.021	-0.023	-0.250
0.680	0.124	0.123	0.126	0.133	0.120	0.097	0.122	0.119	-0.016
0.740	0.208	0.204	0.208	0.213	0.202	0.174	0.203	0.203	0.124
0.800	0.272	0.266	0.268	0.276	0.266	0.235	0.268	0.267	0.207
0.850	0.291	0.286	0.289	0.294	0.280	0.242	0.289	0.288	0.271
0.900	0.293	0.287	0.288	0.292	0.271	0.227	0.291	0.291	0.292
0.950	0.233	0.228	0.229	0.233	0.198	0.130	0.230	0.232	0.294
0.980	0.131	0.128	0.126	0.129	0.077	-0.033	0.127	0.131	0.234
1.000	-0.060	-0.061	-0.062	-0.065	-0.159	-0.386	-0.078	-0.057	-0.059

Table 3 (continued)

M = 0.79

α	1.5	1.75	2.0	2.5	3.5	4.0	4.5
C_L	0.438	0.530	0.598	0.699	0.808	0.843	0.879
C_M	-0.108	-0.110	-0.084	-0.145	-0.163	-0.166	-0.167
C_D	0.0126	0.0143	0.0127				

C_p

x/c									
Upper surface									
0.000	1.079	1.064	1.051	1.046	1.008	0.989	0.968	1.0716	1.068
0.005	-0.188	-0.225	-0.257	-0.295	-0.383	-0.426	-0.474	-0.2056	-0.208
0.010	-0.426	-0.461	-0.491	-0.537	-0.657	-0.719	-0.839	-0.4410	-0.440
0.015	-1.035	-1.064	-1.087	-1.141	-1.198	-1.222	-1.255	-1.0422	-1.041
0.020	-1.156	-1.189	-1.214	-1.265	-1.312	-1.337	-1.363	-1.1648	-1.170
0.030	-1.170	-1.209	-1.237	-1.265	-1.340	-1.371	-1.406	-1.1831	-1.182
0.050	-1.091	-1.134	-1.167	-1.198	-1.289	-1.327	-1.367	-1.1100	-1.111
0.075	-1.028	-1.075	-1.110	-1.147	-1.234	-1.270	-1.309	-1.0520	-1.053
0.100	-0.978	-1.024	-1.059	-1.109	-1.193	-1.231	-1.272	-1.0028	-1.000
0.150	-0.927	-0.983	-1.020	-1.064	-1.154	-1.190	-1.232	-0.9649	-0.968
0.200	-0.879	-0.938	-0.978	-1.013	-1.110	-1.146	-1.185	-0.9220	-0.925
0.250	-0.773	-0.941	-0.983	-1.025	-1.109	-1.148	-1.187	-0.9284	-0.931
0.300	-0.435	-0.918	-0.968	-1.024	-1.102	-1.139	-1.175	-0.9112	-0.914
0.350	-0.513	-0.764	-0.829	-0.883	-1.043	-1.130	-1.179	-0.7692	-0.771
0.400	-0.606	-0.738	-0.873	-0.924	-1.015	-1.075	-1.165	-0.8279	-0.829
0.500	-0.621	-0.459	-0.880	-0.923	-1.005	-1.040	-1.078	-0.8153	-0.819
0.560	-0.616	-0.530	-0.825	-0.951	-1.028	-1.064	-1.100	-0.5429	-0.626
0.620	-0.493	-0.515	-0.529	-0.896	-1.065	-1.113	-1.147	-0.4596	-0.466
0.680	-0.488	-0.502	-0.420	-0.903	-1.000	-1.041	-0.888	-0.4761	-0.473
0.740	-0.428	-0.438	-0.395	-0.558	-0.719	-0.583	-0.558	-0.4311	-0.436
0.800	-0.400	-0.407	-0.378	-0.343	-0.453	-0.465	-0.490	-0.4030	-0.410
0.850	-0.353	-0.359	-0.341	-0.294	-0.376	-0.421	-0.464	-0.3555	-0.367
0.900	-0.285	-0.288	-0.277	-0.259	-0.318	-0.393	-0.439	-0.2855	-0.299
0.950	-0.183	-0.185	-0.182	-0.164	-0.268	-0.351	-0.403	-0.1831	-0.202
0.980	-0.104	-0.106	-0.108	-0.118	-0.245	-0.324	-0.387	-0.1056	-0.128
1.000	-0.056	-0.058	-0.060	-0.072	-0.208	-0.292	-0.354	-0.0588	-0.071
Lower surface									
0.000	1.079	1.064	1.051	1.046	1.008	0.989	0.968	1.0716	1.068
0.005	0.859	0.884	0.903	0.931	0.978	0.998	1.020	0.8831	0.884
0.010	0.565	0.597	0.625	0.660	0.728	0.758	0.794	0.5934	0.597
0.020	0.358	0.394	0.416	0.453	0.521	0.552	0.589	0.3938	0.391
0.050	-0.089	-0.053	-0.022	0.003	0.080	0.114	0.154	-0.0542	-0.053
0.100	-0.394	-0.350	-0.316	-0.263	-0.185	-0.152	-0.112	-0.3555	-0.349
0.150	-0.465			-0.368	-0.298	-0.270	-0.233		-0.434
0.200	-0.567	-0.515	-0.477	-0.420	-0.357	-0.331	-0.297	-0.5313	-0.526
0.280	-0.522	-0.494	-0.466	-0.430	-0.388	-0.373	-0.348	-0.5050	-0.507
0.360	-0.577	-0.517	-0.492	-0.462	-0.440	-0.434	-0.414	-0.5693	-0.537
0.440	-0.446	-0.450	-0.416	-0.402	-0.404	-0.410	-0.403	-0.4374	-0.432
0.520	-0.267	-0.258		-0.243	-0.257	-0.268	-0.270	-0.2605	-0.257
0.600	-0.030	-0.022	-0.016	-0.011	-0.026	-0.036	-0.039	-0.0259	-0.021
0.680	0.113	0.120	0.123	0.129	0.112	0.101	0.098	0.1191	0.123
0.740	0.197	0.204	0.208	0.210	0.191	0.180	0.175	0.2031	0.204
0.800	0.262	0.268	0.272	0.273	0.255	0.243	0.239	0.2684	0.268
0.850	0.284	0.289	0.292	0.292	0.269	0.256	0.249	0.2892	0.291
0.900	0.288	0.292	0.294	0.291	0.260	0.243	0.232	0.2931	0.292
0.950	0.230	0.233	0.234	0.230	0.183	0.158	0.142	0.2341	0.232
0.980	0.130	0.132	0.132	0.124	0.052	0.011	-0.015	0.1325	0.130
1.000	-0.056	-0.058	-0.060	-0.072	-0.208	-0.292	-0.354	-0.0588	-0.071

M = 0.795

1.75	1.75
0.538	0.544
-0.114	-0.120
	0.0127

M = 0.8

α	1.0	1.5	1.75	2.0	2.5	3.0	3.5	5.0
C_L	0.317	0.470	0.550	0.614	0.679	0.723	0.771	0.888
C_M	-0.111	-0.113	-0.122	-0.137	-0.156	-0.158	-0.167	-0.177
C_D	0.0130	0.0133	0.0125	0.0165		0.0298		

C_p

x/c								
Upper surface								
0.000	1.112	1.087	1.076	1.066	1.064	1.030	1.028	0.967
0.005	-0.085	-0.157	-0.186	-0.212	-0.246	-0.296	-0.330	-0.466
0.010	-0.327	-0.393	-0.420	-0.444	-0.480	-0.536	-0.583	-0.839
0.015	-0.932	-0.994	-1.018	-1.035	-1.085	-1.094	-1.142	-1.233
0.020	-1.055	-1.112	-1.139	-1.159	-1.187	-1.228	-1.256	-1.334
0.030	-1.045	-1.125	-1.158	-1.181	-1.206	-1.255	-1.281	-1.378
0.050	-0.961	-1.049	-1.086	-1.111	-1.137	-1.202	-1.231	-1.344
0.075	-0.892	-0.991	-1.029	-1.057	-1.090	-1.146	-1.177	-1.287
0.100	-0.825	-0.937	-0.980	-1.007	-1.055	-1.109	-1.138	-1.253
0.150	-0.486	-0.901	-0.945	-0.973	-1.011	-1.070	-1.101	-1.215
0.200	-0.425	-0.859	-0.904	-0.934	-0.962	-1.030	-1.060	-1.172
0.250	-0.546	-0.865	-0.912	-0.941	-0.981	-1.026	-1.062	-1.170
0.320	-0.549	-0.758	-0.898	-0.931	-0.980	-1.023	-1.053	-1.162
0.380	-0.554	-0.669	-0.764	-0.801	-0.846	-0.897	-0.974	-1.171
0.440	-0.623	-0.579	-0.821	-0.847	-0.886	-0.935	-0.974	-1.176
0.500	-0.617	-0.513	-0.818	-0.857	-0.888	-0.939	-0.968	-1.073
0.560	-0.626	-0.584	-0.706	-0.826	-0.916	-0.951	-0.993	-1.092
0.620	-0.472	-0.616	-0.752	-0.815	-0.865	-0.912	-1.020	-1.138
0.680	-0.468	-0.579	-0.563	-0.858	-0.875	-0.937	-0.965	-1.099
0.740	-0.417	-0.420	-0.381	-0.597	-0.914	-0.934	-0.913	-0.612
0.800	-0.393	-0.399	-0.363	-0.348	-0.489	-0.464	-0.508	-0.539
0.850	-0.347	-0.353	-0.331	-0.287	-0.330	-0.348	-0.396	-0.519
0.900	-0.280	-0.283	-0.269	-0.233	-0.248	-0.285	-0.343	-0.504
0.950	-0.177	-0.181	-0.175	-0.159	-0.167	-0.224	-0.304	-0.472
0.980	-0.098	-0.102	-0.101	-0.098	-0.127	-0.217	-0.285	-0.464
1.000	-0.053	-0.057	-0.058	-0.066	-0.102	-0.203	-0.248	-0.445
Lower surface								
0.000	1.112	1.087	1.076	1.066	1.064	1.030	1.028	0.967
0.005	0.810	0.858	0.881	0.898	0.922	0.949	0.970	1.033
0.010	0.501	0.563	0.594	0.615	0.646	0.687	0.714	0.810
0.020	0.296	0.374	0.391	0.409	0.441	0.480	0.508	0.607
0.050	-0.151	-0.086	-0.054	-0.029	-0.010	0.046	0.064	0.173
0.100	-0.467	-0.399	-0.359	-0.331	-0.284	-0.248	-0.207	-0.093
0.150	-0.550				-0.393	-0.336	-0.323	-0.221
0.200	-0.619	-0.580	-0.542	-0.513	-0.457	-0.433	-0.388	-0.295
0.280	-0.697	-0.570	-0.522	-0.491	-0.465	-0.447	-0.424	-0.356
0.360	-0.772	-0.623	-0.613	-0.584	-0.523	-0.517	-0.492	-0.442
0.440	-0.430	-0.443	-0.439	-0.436	-0.432	-0.445	-0.445	-0.441
0.520	-0.266	-0.265	-0.259	-0.257	-0.258	-0.275	-0.276	-0.298
0.600	-0.042	-0.029	-0.023	-0.020	-0.021	-0.035	-0.038	-0.056
0.680	0.101	0.113	0.119	0.121	0.121	0.104	0.101	0.083
0.740	0.186	0.198	0.203	0.205	0.202	0.188	0.182	0.160
0.800	0.251	0.263	0.268	0.269	0.265	0.253	0.247	0.225
0.850	0.275	0.285	0.289	0.289	0.286	0.270	0.262	0.234
0.900	0.282	0.290	0.294	0.293	0.283	0.263	0.250	0.216
0.950	0.227	0.233	0.234	0.232	0.219	0.185	0.170	0.117
0.980	0.130	0.132	0.133	0.128	0.108	0.056	0.033	-0.048
1.000	-0.053	-0.057	-0.058	-0.066	-0.102	-0.203	-0.248	-0.445

Table 3 (continued)

M = 0.81

α	1.5	1.75	2.0	2.5	4.0	4.5
C_L	0.487	0.559	0.60	0.648	0.788	0.824
C_M	-0.129	-0.140	-0.148	-0.161	-0.162	-0.179
C_D	0.0143	0.0173	0.0211			

M = 0.82

α	2.5	3.5
C_L	0.594	0.698
C_M	-0.160	-0.176

C_p

x/c								
Upper surface								
0.000	1.099	1.090	1.080	1.078	1.008	1.009	1.089	1.062
0.005	-0.118	-0.144	-0.166	-0.198	-0.346	-0.368	-0.154	-0.232
0.010	-0.352	-0.377	-0.397	-0.429	-0.605	-0.654	-0.382	-0.469
0.015	-0.947	-0.969	-0.986	-1.031	-1.107	-1.146	-0.981	-1.038
0.020	-1.065	-1.087	-1.106	-1.132	-1.235	-1.259	-1.079	-1.145
0.030	-1.075	-1.104	-1.125	-1.149	-1.261	-1.294	-1.094	-1.168
0.050	-1.003	-1.033	-1.057	-1.081	-1.224	-1.256	-1.027	-1.114
0.075	-0.946	-0.977	-1.004	-1.035	-1.167	-1.202	-0.982	-1.068
0.100	-0.900	-0.931	-0.960	-1.005	-1.129	-1.167	-0.956	-1.033
0.150	-0.864	-0.901	-0.927	-0.961	-1.108	-1.132	-0.913	-1.001
0.200	-0.827	-0.862	-0.890	-0.915	-1.063	-1.092	-0.870	-0.961
0.260	-0.836	-0.874	-0.901	-0.939	-1.063	-1.097	-0.898	-0.972
0.320	-0.765	-0.863	-0.893	-0.938	-1.067	-1.085	-0.897	-0.977
0.380	-0.691	-0.738	-0.768	-0.809	-1.040	-1.094	-0.774	-0.867
0.440	-0.752	-0.798	-0.818	-0.850	-0.995	-1.070	-0.814	-0.897
0.500	-0.715	-0.797	-0.825	-0.855	-0.972	-1.005	-0.823	-0.895
0.560	-0.660	-0.705	-0.789	-0.882	-0.992	-1.028	-0.849	-0.920
0.620	-0.718	-0.757	-0.792	-0.835	-1.031	-1.076	-0.805	-0.928
0.680	-0.764	-0.808	-0.835	-0.846	-0.995	-1.054	-0.818	-0.898
0.740	-0.620	-0.818	-0.853	-0.890	-0.633	-0.870	-0.863	-0.928
0.800	-0.340	-0.433	-0.574	-0.760	-0.453	-0.601	-0.897	-0.975
0.850	-0.299	-0.289	-0.317	-0.375	-0.394	-0.499	-0.440	-0.523
0.900	-0.250	-0.222	-0.223	-0.263	-0.379	-0.480	-0.288	-0.386
0.950	-0.164	-0.149	-0.148	-0.193	-0.346	-0.442	-0.224	-0.350
0.980	-0.094	-0.093	-0.104	-0.158	-0.324	-0.430	-0.195	-0.340
1.000	-0.056	-0.068	-0.094	-0.146	-0.309	-0.413	-0.192	-0.314
Lower surface								
0.000	1.099	1.090	1.080	1.078	1.008	1.009	1.089	1.062
0.005	0.856	0.876	0.890	0.913	0.995	1.010	0.906	0.955
0.010	0.562	0.585	0.606	0.633	0.758	0.772	0.622	0.693
0.020	0.359	0.384	0.403	0.430	0.554	0.568	0.421	0.490
0.050	-0.083	-0.058	-0.038	-0.021	0.127	0.130	-0.029	0.045
0.100	-0.401	-0.371	-0.347	-0.305	-0.148	-0.145	-0.318	-0.238
0.150	-0.478			-0.415	-0.242	-0.270	-0.429	-0.356
0.200	-0.586	-0.563	-0.542	-0.498	-0.341	-0.347	-0.517	-0.444
0.280	-0.633	-0.593	-0.552	-0.494	-0.376	-0.402	-0.568	-0.471
0.360	-0.689	-0.632	-0.615	-0.615	-0.458	-0.528	-0.642	-0.600
0.440	-0.450	-0.433	-0.436	-0.430	-0.426	-0.489	-0.738	-0.713
0.520	-0.253	-0.257	-0.259	-0.266	-0.265	-0.305	-0.247	-0.265
0.600	-0.028	-0.028	-0.029	-0.032	-0.028	-0.059	-0.041	-0.054
0.680	0.113	0.115	0.114	0.111	0.112	0.082	0.101	0.087
0.740	0.197	0.199	0.197	0.192	0.191	0.162	0.182	0.168
0.800	0.262	0.264	0.262	0.256	0.251	0.228	0.248	0.233
0.850	0.285	0.286	0.285	0.275	0.264	0.239	0.267	0.248
0.900	0.290	0.290	0.284	0.271	0.253	0.224	0.262	0.238
0.950	0.233	0.231	0.222	0.204	0.161	0.131	0.190	0.153
0.980	0.133	0.127	0.112	0.084	0.011	-0.033	0.064	0.007
1.000	-0.056	-0.068	-0.094	-0.146	-0.309	-0.413	-0.192	-0.314

M = 0.825

α	1.0	1.5	1.75	2.0	3.0
C_L	0.288	0.446	0.487	0.516	0.624
C_M	-0.105	-0.137	-0.143	-0.146	-0.164

M = 0.84

α	1.75	2.0	1.5
C_L	0.339	0.373	0.290
C_M	-0.086	-0.093	-0.074

C_p

x/c								
Upper surface								
0.000	1.132	1.115	1.108	1.102	1.078	1.128	1.122	1.134
0.005	-0.013	-0.064	-0.084	-0.104	-0.179	-0.035	-0.052	-0.020
0.010	-0.250	-0.296	-0.315	-0.334	-0.403	-0.259	-0.274	-0.240
0.015	-0.833	-0.878	-0.896	-0.913	-0.966	-0.834	-0.848	-0.818
0.020	-0.953	-0.998	-1.013	-1.030	-1.086	-0.943	-0.957	-0.9.9
0.030	-0.941	-1.002	-1.024	-1.046	-1.105	-0.944	-0.963	-0.922
0.050	-0.866	-0.933	-0.957	-0.980	-1.048	-0.879	-0.899	-0.855
0.075	-0.806	-0.877	-0.904	-0.928	-1.004	-0.831	-0.853	-0.806
0.100	-0.748	-0.832	-0.863	-0.890	-0.971	-0.794	-0.817	-0.764
0.150	-0.709	-0.801	-0.834	-0.859	-0.946	-0.777	-0.802	-0.743
0.200	-0.689	-0.773	-0.799	-0.826	-0.899	-0.729	-0.750	-0.707
0.260	-0.486	-0.785	-0.815	-0.840	-0.927	-0.773	-0.795	-0.746
0.320	-0.483	-0.694	-0.798	-0.835	-0.932	-0.777	-0.801	-0.725
0.380	-0.506	-0.657	-0.690	-0.717	-0.811	-0.652	-0.676	-0.627
0.440	-0.571	-0.718	-0.756	-0.773	-0.853	-0.710	-0.726	-0.679
0.500	-0.604	-0.700	-0.754	-0.780	-0.855	-0.731	-0.734	-0.686
0.560	-0.638	-0.658	-0.671	-0.721	-0.877	-0.654	-0.737	-0.625
0.620	-0.692	-0.709	-0.731	-0.754	-0.843	-0.698	-0.717	-0.688
0.680	-0.730	-0.754	-0.782	-0.795	-0.866	-0.745	-0.759	-0.725
0.740	-0.735	-0.774	-0.794	-0.815	-0.876	-0.759	-0.775	-0.739
0.800	-0.564	-0.829	-0.849	-0.854	-0.931	-0.727	-0.766	-0.705
0.850	-0.274	-0.367	-0.379	-0.381	-0.474	-0.293	-0.318	-0.273
0.900	-0.195	-0.220	-0.234	-0.251	-0.357	-0.199	-0.226	-0.171
0.950	-0.119	-0.137	-0.156	-0.184	-0.314	-0.140	-0.176	-0.102
0.980	-0.066	-0.092	-0.118	-0.151	-0.303	-0.117	-0.156	-0.079
1.000	-0.071	-0.094	-0.130	-0.166	-0.305	-0.201	-0.241	-0.146
Lower surface								
0.000	1.132	1.115	1.108	1.102	1.078	1.128	1.122	1.134
0.005	0.815	0.853	0.867	0.880	0.925	0.860	0.872	0.846
0.010	0.510	0.557	0.578	0.595	0.658	0.571	0.586	0.552
0.020	0.312	0.357	0.376	0.392	0.453	0.373	0.387	0.355
0.050	-0.126	-0.081	-0.062	-0.045	0.015	-0.064	-0.049	-0.081
0.100	-0.565	-0.398	-0.381	-0.364	-0.285	-0.419	-0.354	-0.405
0.150		-0.486	-0.468	-0.449	-0.370	-0.453	-0.443	-0.486
0.200	-0.634	-0.592	-0.573	-0.558	-0.495	-0.565	-0.552	-0.582
0.280	-0.698	-0.653	-0.637	-0.622	-0.541	-0.636	-0.624	-0.652
0.360	-0.811	-0.763	-0.740	-0.720	-0.632	-0.755	-0.742	-0.772
0.440	-0.900	-0.835	-0.806	-0.792	-0.746	-0.853	-0.840	-0.870
0.520	-0.281	-0.256	-0.253	-0.256	-0.300	-0.321	-0.337	-0.320
0.600	-0.140	-0.058	-0.052	-0.050	-0.064	-0.253	-0.256	-0.268
0.680	-0.038	0.076	0.085	0.086	0.074	-0.185	-0.187	-0.216
0.740	0.065	0.169	0.173	0.173	0.159	-0.113	-0.110	-0.149
0.800	0.168	0.242	0.243	0.242	0.223	-0.031	-0.019	-0.072
0.850	0.225	0.270	0.268	0.264	0.243	0.056	0.070	0.012
0.900	0.253	0.275	0.272	0.267	0.235	0.159	0.154	0.125
0.950	0.209	0.215	0.207	0.196	0.150	0.122	0.118	0.108
0.980	0.118	0.112	0.095	0.078	0.007	0.022	0.008	0.025
1.000	-0.071	-0.094	-0.130	-0.166	-0.305	-0.201	-0.241	-0.146

Table 3 (concluded)

	M = 0.85		M = 0.86		
α	1.0	3.0	1.5	1.75	2.0
c_L	0.140	0.381	0.130	0.152	0.180
c_M	-0.035	-0.082	-0.011	-0.014	-0.019

	c_p				
x/c					
Upper surface					
0.000	1.152	1.107	1.149	1.145	1.139
0.005	0.049	-0.092	0.035	0.017	0.001
0.010	-0.176	-0.307	-0.185	-0.198	-0.215
0.015	-0.746	-0.862	-0.747	-0.760	-0.775
0.020	-0.855	-0.977	-0.855	-0.867	-0.880
0.030	-0.833	-0.992	-0.847	-0.865	-0.885
0.050	-0.765	-0.936	-0.783	-0.803	-0.824
0.075	-0.714	-0.896	-0.736	-0.757	-0.779
0.100	-0.661	-0.870	-0.694	-0.719	-0.746
0.150	-0.657	-0.846	-0.675	-0.708	-0.734
0.200	-0.618	-0.803	-0.648	-0.668	-0.689
0.260	-0.492	-0.838	-0.689	-0.711	-0.733
0.320	-0.521	-0.845	-0.672	-0.718	-0.742
0.380	-0.521	-0.731	-0.581	-0.600	-0.623
0.440	-0.529	-0.723	-0.634	-0.658	-0.673
0.500	-0.546	-0.777	-0.643	-0.660	-0.682
0.560	-0.600	-0.805	-0.588	-0.614	-0.691
0.620	-0.633	-0.772	-0.649	-0.656	-0.673
0.680	-0.674	-0.797	-0.691	-0.698	-0.714
0.740	-0.674	-0.808	-0.701	-0.715	-0.729
0.800	-0.745	-0.874	-0.766	-0.770	-0.768
0.850	-0.357	-0.451	-0.336	-0.305	-0.307
0.900	-0.169	-0.328	-0.198	-0.202	-0.217
0.950	-0.084	-0.293	-0.155	-0.160	-0.180
0.980	-0.052	-0.287	-0.131	-0.148	-0.172
1.000	-0.055	-0.362	-0.142	-0.171	-0.211
Lower surface					
0.000	1.152	1.107	1.149	1.145	1.139
0.005	0.820	0.921	0.855	0.868	0.880
0.010	0.520	0.653	0.566	0.582	0.597
0.020	0.329	0.453	0.374	0.390	0.403
0.050	-0.101	0.022	-0.053	-0.037	-0.024
0.100	-0.518	-0.286	-0.467	-0.448	-0.417
0.150	-0.518	-0.372	-0.409	-0.415	-0.409
0.200	-0.574	-0.486	-0.540	-0.533	-0.523
0.280	-0.654	-0.566	-0.623	-0.608	-0.596
0.360	-0.774	-0.680	-0.737	-0.726	-0.716
0.440	-0.885	-0.777	-0.840	-0.828	-0.817
0.520	-0.372	-0.892	-0.954	-0.958	-0.949
0.600	-0.352	-0.318	-0.436	-0.442	-0.452
0.680	-0.318	-0.264	-0.386	-0.385	-0.384
0.740	-0.285	-0.203	-0.356	-0.352	-0.349
0.800	-0.250	-0.128	-0.330	-0.324	-0.318
0.850	-0.195	-0.045	-0.287	-0.277	-0.270
0.900	-0.100	0.047	-0.206	-0.193	-0.184
0.950	-0.047	0.031	-0.144	-0.134	-0.128
0.980	-0.043	-0.058	-0.127	-0.127	-0.132
1.000	-0.055	-0.362	-0.142	-0.171	-0.211

Table 4

PRESSURE COEFFICIENTS FOR RAE(NPL)9530

M = 0.3

α	-0.82	0.18	0.68	0.93	1.18	2.18	3.18	4.18	4.42	5.42
C_L	0.063	0.178	0.231	0.256	0.285	0.392	0.510	0.615	0.691	0.803
C_M	-0.070	-0.072	-0.071	-0.072	-0.073	-0.073	-0.074	-0.073	-0.071	-0.071
C_D	0.011	0.011	0.011	0.011	0.011	0.012	0.0123	0.012		

C_p

x/c										
Upper surface										
0.000	0.990	1.022	1.020	1.018	1.010	0.941	0.813	0.620	0.459	0.171
0.002	0.763	0.572	0.448	0.381	0.314	0.005	-0.376	-0.807	-1.124	-1.636
0.005	0.431	0.162	0.008	-0.081	-0.162	-0.540	-0.991	-1.494	-1.866	-2.464
0.009	-0.028	-0.363	-0.547	-0.658	-0.752	-1.200	-1.706	-2.277	-2.655	-3.299
0.013	-0.287	-0.621	-0.789	-0.908	-0.993	-1.419	-1.909	-2.423	-2.789	-3.375
0.018	-0.380	-0.679	-0.834	-0.950	-1.014	-1.387	-1.819	-2.249	-2.575	-3.037
0.025	-0.398	-0.642	-0.785	-0.880	-0.937	-1.238	-1.595	-1.978	-2.295	-2.818
0.035	-0.384	-0.591	-0.714	-0.782	-0.836	-1.081	-1.423	-1.881	-2.212	-2.676
0.050	-0.338	-0.508	-0.605	-0.660	-0.699	-0.923	-1.085	-1.195	-1.383	-1.625
0.075	-0.313	-0.446	-0.521	-0.572	-0.601	-0.692	-0.866	-1.042	-1.168	-1.343
0.100	-0.287	-0.402	-0.469	-0.504	-0.514	-0.627	-0.778	-0.914	-1.012	-1.150
0.150	-0.271	-0.353	-0.385	-0.421	-0.440	-0.541	-0.662	-0.761	-0.830	-0.931
0.200	-0.258	-0.324	-0.365	-0.391	-0.408	-0.485	-0.600	-0.670	-0.720	-0.805
0.260	-0.256	-0.316	-0.343	-0.372	-0.389	-0.440	-0.536	-0.594	-0.638	-0.697
0.320	-0.249	-0.296	-0.316	-0.350	-0.354	-0.406	-0.489	-0.538	-0.575	-0.631
0.380	-0.258	-0.302	-0.315	-0.347	-0.345	-0.389	-0.462	-0.505	-0.536	-0.591
0.440	-0.251	-0.291	-0.309	-0.329	-0.329	-0.366	-0.432	-0.461	-0.497	-0.540
0.500	-0.249	-0.280	-0.297	-0.318	-0.315	-0.345	-0.407	-0.434	-0.462	-0.502
0.560	-0.251	-0.275	-0.292	-0.320	-0.313	-0.340	-0.392	-0.413	-0.436	-0.472
0.620	-0.249	-0.268	-0.278	-0.303	-0.306	-0.328	-0.363	-0.388	-0.401	-0.427
0.680	-0.241	-0.266	-0.266	-0.288	-0.294	-0.306	-0.339	-0.360	-0.371	-0.389
0.740	-0.225	-0.243	-0.245	-0.265	-0.269	-0.280	-0.309	-0.323	-0.333	-0.347
0.800	-0.216	-0.224	-0.234	-0.255	-0.250	-0.259	-0.280	-0.288	-0.299	-0.305
0.850	-0.203	-0.224	-0.218	-0.242	-0.241	-0.247	-0.250	-0.260	-0.266	-0.270
0.900	-0.193	-0.188	-0.194	-0.212	-0.201	-0.208	-0.211	-0.214	-0.217	-0.218
0.950	-0.134	-0.128	-0.126	-0.143	-0.132	-0.135	-0.132	-0.130	-0.131	-0.134
0.980	-0.088	-0.081	-0.078	-0.090	-0.084	-0.080	-0.083	-0.077	-0.080	-0.082
1.000	-0.047	-0.042	-0.035	-0.054	-0.047	-0.038	-0.045	-0.044	-0.047	-0.050
Lower surface										
0.000	0.990	1.022	1.020	1.018	1.010	0.941	0.813	0.620	0.459	0.171
0.002	0.008	0.159	0.492	0.548	0.608	0.815	0.948	1.012	1.022	1.001
0.006	-0.425	-0.222	-0.031	0.039	0.125	0.421	0.648	0.824	0.911	0.992
0.011	-0.680	-0.340	-0.166	-0.109	-0.029	0.240	0.463	0.650	0.749	0.875
0.017	-0.685	-0.399	-0.236	-0.187	-0.112	0.126	0.335	0.518	0.621	0.754
0.027	-0.618	-0.379	-0.252	-0.223	-0.158	0.045	0.224	0.387	0.486	0.616
0.050	-0.494	-0.317	-0.222	-0.205	-0.162	-0.001	0.128	0.267	0.345	0.457
0.100	-0.407	-0.279	-0.210	-0.205	-0.174	-0.057	0.037	0.140	0.200	0.291
0.150	-0.375	-0.264	-0.208	-0.214	-0.181	-0.091	-0.015	0.066	0.121	0.197
0.200	-0.341	-0.257	-0.206	-0.219	-0.188	-0.110	-0.046	0.022	0.070	0.137
0.280	-0.347	-0.264	-0.238	-0.241	-0.209	-0.143	-0.093	-0.033	0.001	0.059
0.360	-0.354	-0.287	-0.260	-0.262	-0.236	-0.182	-0.139	-0.089	-0.066	-0.010
0.440	-0.347	-0.282	-0.266	-0.267	-0.248	-0.207	-0.160	-0.114	-0.094	-0.048
0.520	-0.267	-0.222	-0.206	-0.214	-0.195	-0.157	-0.123	-0.089	-0.070	-0.034
0.600	-0.099	-0.067	-0.052	-0.062	-0.045	-0.014	0.007	0.029	0.047	0.078
0.680	0.031	0.060	0.068	0.063	0.075	0.100	0.114	0.133	0.143	0.169
0.740	0.117	0.143	0.148	0.141	0.151	0.175	0.185	0.202	0.212	0.237
0.800	0.163	0.187	0.191	0.180	0.197	0.215	0.224	0.239	0.242	0.260
0.850	0.189	0.213	0.219	0.205	0.222	0.242	0.251	0.262	0.261	0.281
0.900	0.180	0.203	0.208	0.198	0.211	0.232	0.231	0.236	0.240	0.251
0.950	0.148	0.159	0.157	0.148	0.164	0.173	0.180	0.181	0.186	0.193
0.980	0.046	0.060	0.063	0.051	0.056	0.066	0.068	0.070	0.059	0.062
1.000	-0.047	-0.042	-0.035	-0.054	-0.047	-0.038	-0.045	-0.044	-0.047	-0.050

M = 0.3

α	6.42	8.18	9.18	10.18	11.18	11.68	12.18	12.68	13.18
C_L	0.904	1.053	1.156	1.246	1.080	1.080	1.093	1.086	1.083
C_M	-0.070	-0.069	-0.066	-0.062	-0.111	-0.129	-0.142	-0.154	-0.162

C_p

x/c									
Upper surface									
0.000	-0.178	-0.728	-1.174	-1.630	-0.406	-0.406	-0.415	-0.405	-0.415
0.002	-2.232	-3.115	-3.787	-4.430	-1.888	-1.951	-1.848	-2.046	-1.658
0.005	-5.108	-4.094	-4.840	-5.561	-1.627	-1.430	-1.268	-1.239	-1.140
0.009	-4.002	-5.052	-5.866	-6.589	-2.779	-2.911	-3.016	-2.986	-2.929
0.013	-4.007	-4.900	-5.558	-6.106	-1.206	-1.035	-0.985	-0.932	-0.907
0.018	-3.599	-4.487	-5.167	-5.795	-2.308	-2.184	-2.403	-2.371	-2.428
0.025	-3.456	-4.389	-5.158	-5.733	-2.263	-1.897	-1.742	-1.710	-1.513
0.035	-2.169	-2.594	-2.957	-3.301	-2.039	-2.080	-2.094	-2.194	-2.244
0.050	-1.875	-2.230	-2.459	-2.696	-1.601	-1.472	-1.477	-1.448	-1.380
0.075	-1.524	-1.781	-1.964	-2.134	-1.757	-1.710	-1.703	-1.553	-1.474
0.100	-1.303	-1.502	-1.656	-1.800	-1.225	-1.096	-1.018	-0.923	-0.878
0.150	-1.044	-1.197	-1.308	-1.426	-1.592	-1.577	-1.475	-1.365	-1.332
0.200	-0.895	-1.025	-1.112	-1.201	-1.255	-1.085	-1.056	-0.958	-0.921
0.260	-0.776	-0.883	-0.952	-1.019	-1.105	-1.042	-1.037	-1.039	-0.982
0.320	-0.698	-0.777	-0.833	-0.892	-1.147	-1.047	-1.080	-1.025	-0.966
0.380	-0.642	-0.709	-0.760	-0.798	-1.058	-1.056	-1.037	-1.002	-0.971
0.440	-0.586	-0.648	-0.683	-0.718	-0.851	-0.884	-0.910	-0.922	-0.925
0.500	-0.540	-0.585	-0.619	-0.655	-0.856	-0.923	-0.948	-0.969	-0.938
0.560	-0.498	-0.546	-0.568	-0.585	-0.683	-0.747	-0.802	-0.866	-0.842
0.620	-0.456	-0.494	-0.509	-0.517	-0.652	-0.773	-0.807	-0.859	-0.866
0.680	-0.409	-0.440	-0.451	-0.457	-0.584	-0.682	-0.739	-0.803	-0.840
0.740	-0.360	-0.386	-0.396	-0.396	-0.523	-0.617	-0.725	-0.777	-0.805
0.800	-0.313	-0.339	-0.335	-0.333	-0.451	-0.553	-0.640	-0.698	-0.722
0.850	-0.276	-0.286	-0.277	-0.277	-0.417	-0.505	-0.584	-0.644	-0.710
0.900	-0.220	-0.223	-0.218	-0.211	-0.382	-0.447	-0.502	-0.590	-0.650
0.950	-0.129	-0.132	-0.123	-0.127	-0.343	-0.432	-0.497	-0.545	-0.614
0.980	-0.078	-0.082	-0.078	-0.089	-0.340	-0.395	-0.439	-0.520	-0.563
1.000	-0.056	-0.064	-0.069	-0.087	-0.340	-0.409	-0.450	-0.501	-0.546
Lower surface									
0.000	-0.178	-0.728	-1.174	-1.630	-0.406	-0.406	-0.415	-0.405	-0.415
0.002	0.930	0.710	0.497	0.253	0.781	0.765	0.749	0.736	0.719
0.006	1.022	0.999	0.935	0.840	1.012	1.010	1.010	1.008	1.012
0.011	0.959	1.017	1.022	1.006	1.012	1.014	1.017	1.017	1.022
0.017	0.859	0.961	1.001	1.022	0.931	0.925	0.931	0.927	0.919
0.027	0.727	0.847	0.914	0.963	0.845	0.857	0.858	0.859	0.891
0.050	0.560	0.677	0.751	0.810	0.660	0.660	0.663	0.659	0.679
0.100	0.375	0.474	0.546	0.607	0.483	0.490	0.490	0.489	0.507
0.150	0.268	0.356	0.420	0.475	0.363	0.359	0.361	0.360	0.381
0.200	0.201	0.283	0.337	0.384	0.282	0.278	0.281	0.278	0.296
0.280	0.112	0.180	0.228	0.269	0.165	0.161	0.162	0.155	0.173
0.360	0.036	0.094	0.134	0.173	0.069	0.067	0.057	0.050	0.062
0.440	-0.010	0.038	0.075	0.110	0.001	-0.012	-0.019	-0.029	-0.019
0.520	-0.001	0.038	0.069	0.092	-0.010	-0.024	-0.034	-0.045	-0.043
0.600	0.096	0.115	0.136	0.159	0.059	0.046	0.033	0.020	0.024
0.680	0.183	0.211	0.237	0.251	0.143	0.133	0.115	0.101	0.098
0.740	0.250	0.271	0.289	0.299	0.202	0.191	0.178	0.162	0.167
0.800	0.271	0.285	0.303	0.307	0.200	0.184	0.176	0.150	0.147
0.850	0.289	0.306	0.319	0.323	0.223	0.194	0.185	0.166	0.157
0.900	0.255	0.271	0.281	0.281	0.160	0.133	0.115	0.096	0.090
0.950	0.194	0.204	0.209	0.209	0.057	0.026	0.006	-0.026	-0.034
0.980	0.052	0.062	0.062	0.052	-0.141	-0.189	-0.225	-0.263	-0.283
1.000	-0.056	-0.064	-0.069	-0.087	-0.340	-0.409	-0.450	-0.501	-0.546

Table 4 (continued)

M = 0.4

α	-0.82	0.18	0.93	1.18	2.18	3.18	4.18	5.18	6.18	7.18
C_L	0.057	0.176	0.266	0.294	0.416	0.520	0.643	0.768	0.880	0.978
C_M	-0.072	-0.074	-0.075	-0.075	-0.076	-0.076	-0.075	-0.074	-0.073	-0.069
C_D		0.0113	0.0115	0.0116	0.0118	0.0121	0.0126			

C_p

x/c										
Upper surface										
0.000	1.007	1.040	1.037	1.030	0.960	0.846	0.669	0.419	0.146	-0.134
0.002	0.795	0.600	0.416	0.344	0.026	-0.318	-0.740	-1.221	-1.714	-2.166
0.005	0.467	0.191	-0.048	-0.137	-0.534	-0.951	-1.455	-2.054	-2.632	-3.132
0.009	0.002	-0.349	-0.644	-0.757	-1.239	-1.730	-2.341	-3.063	-3.801	-4.395
0.013	-0.263	-0.636	-0.916	-1.029	-1.507	-1.994	-2.569	-3.239	-3.926	-4.454
0.018	-0.366	-0.694	-0.959	-1.057	-1.478	-1.887	-2.375	-2.972	-3.580	-4.146
0.025	-0.385	-0.668	-0.903	-0.980	-1.331	-1.668	-2.139	-2.768	-3.456	-4.073
0.035	-0.376	-0.613	-0.800	-0.870	-1.169	-1.533	-2.067	-2.344	-2.441	-2.986
0.050	-0.331	-0.522	-0.676	-0.728	-1.017	-0.995	-1.306	-1.565	-1.801	-2.020
0.075	-0.310	-0.463	-0.582	-0.629	-0.731	-0.914	-1.107	-1.290	-1.485	-1.651
0.100	-0.289	-0.415	-0.482	-0.510	-0.627	-0.807	-0.961	-1.107	-1.276	-1.409
0.150	-0.259	-0.362	-0.438	-0.460	-0.580	-0.678	-0.796	-0.902	-1.031	-1.136
0.200	-0.253	-0.339	-0.399	-0.424	-0.519	-0.605	-0.696	-0.791	-0.882	-0.960
0.260	-0.250	-0.329	-0.375	-0.390	-0.472	-0.540	-0.621	-0.696	-0.775	-0.841
0.320	-0.247	-0.315	-0.355	-0.369	-0.440	-0.497	-0.563	-0.618	-0.691	-0.739
0.380	-0.259	-0.315	-0.353	-0.361	-0.421	-0.474	-0.535	-0.579	-0.639	-0.677
0.440	-0.253	-0.304	-0.339	-0.345	-0.394	-0.445	-0.493	-0.537	-0.595	-0.613
0.500	-0.253	-0.295	-0.326	-0.333	-0.380	-0.420	-0.461	-0.497	-0.540	-0.572
0.560	-0.257	-0.294	-0.321	-0.327	-0.370	-0.400	-0.439	-0.467	-0.509	-0.527
0.620	-0.248	-0.281	-0.303	-0.307	-0.346	-0.372	-0.404	-0.433	-0.461	-0.472
0.680	-0.246	-0.274	-0.294	-0.298	-0.329	-0.352	-0.376	-0.395	-0.418	-0.434
0.740	-0.230	-0.258	-0.279	-0.274	-0.303	-0.316	-0.338	-0.358	-0.375	-0.381
0.800	-0.221	-0.245	-0.254	-0.253	-0.278	-0.290	-0.304	-0.316	-0.318	-0.319
0.850	-0.211	-0.235	-0.237	-0.237	-0.255	-0.264	-0.275	-0.283	-0.285	-0.275
0.900	-0.186	-0.201	-0.208	-0.205	-0.219	-0.222	-0.230	-0.217	-0.225	-0.218
0.950	-0.126	-0.138	-0.140	-0.138	-0.145	-0.147	-0.147	-0.143	-0.141	-0.130
0.980	-0.083	-0.087	-0.086	-0.084	-0.086	-0.084	-0.086	-0.079	-0.079	-0.084
1.000	-0.038	-0.043	-0.042	-0.040	-0.043	-0.044	-0.045	-0.051	-0.058	-0.064
Lower surface										
0.000	1.007	1.040	1.037	1.030	0.960	0.846	0.669	0.419	0.146	-0.134
0.002	0.022	0.353	0.560	0.625	0.832	0.957	1.027	1.040	1.006	0.930
0.006	-0.662	-0.237	0.047	0.135	0.433	0.653	0.829	0.960	1.025	1.038
0.011	-0.729	-0.365	-0.110	-0.031	0.247	0.463	0.652	0.810	0.920	0.983
0.017	-0.726	-0.409	-0.184	-0.116	0.135	0.336	0.623	0.686	0.807	0.895
0.027	-0.655	-0.404	-0.221	-0.164	0.048	0.222	0.390	0.548	0.666	0.764
0.050	-0.520	-0.338	-0.201	-0.161	-0.001	0.133	0.268	0.397	0.506	0.595
0.100	-0.415	-0.299	-0.197	-0.172	-0.057	0.042	0.141	0.242	0.328	0.406
0.150	-0.387	-0.292	-0.216	-0.190	-0.098	-0.018	0.066	0.155	0.230	0.299
0.200	-0.358	-0.276	-0.210	-0.189	-0.114	-0.045	0.027	0.104	0.167	0.226
0.280	-0.358	-0.292	-0.236	-0.220	-0.157	-0.101	-0.039	0.028	0.078	0.133
0.360	-0.369	-0.315	-0.267	-0.250	-0.201	-0.151	-0.099	-0.037	0.004	0.048
0.440	-0.355	-0.313	-0.272	-0.257	-0.216	-0.174	-0.130	-0.084	-0.040	0.000
0.520	-0.273	-0.243	-0.210	-0.197	-0.164	-0.133	-0.098	-0.053	-0.026	0.007
0.600	-0.102	-0.077	-0.053	-0.045	-0.020	0.004	0.026	0.060	0.080	0.105
0.680	0.034	0.055	0.074	0.081	0.098	0.115	0.134	0.161	0.177	0.198
0.740	0.117	0.136	0.150	0.155	0.172	0.184	0.199	0.225	0.237	0.253
0.800	0.173	0.187	0.200	0.204	0.216	0.227	0.241	0.260	0.274	0.283
0.850	0.203	0.216	0.227	0.229	0.241	0.250	0.264	0.279	0.289	0.303
0.900	0.193	0.202	0.214	0.217	0.224	0.233	0.240	0.252	0.263	0.267
0.950	0.149	0.156	0.164	0.167	0.171	0.176	0.182	0.195	0.200	0.201
0.980	0.042	0.041	0.049	0.059	0.059	0.060	0.061	0.073	0.071	0.064
1.000	-0.038	-0.043	-0.042	-0.040	-0.043	-0.044	-0.045	-0.051	-0.058	-0.064

M = 0.4

α	7.5	8.18	8.68	9.18	9.68	10.18	68.0
C_L	0.988	0.992	1.005	1.024	0.823	1.057	0.087
C_M	-0.065	-0.063	-0.070	-0.080	-0.069	-0.105	-0.074

C_p

x/c							
Upper surface							
0.000	-0.087	-0.038	0.000	-0.002	-0.019	-0.020	1.040
0.002	-1.682	-1.518	-1.417	-1.379	-1.321	-1.413	0.474
0.005	-3.181	-2.579	-2.276	-2.135	-2.005	-1.910	0.028
0.009	-2.723	-2.627	-2.144	-1.967	-2.019	-2.206	-0.558
0.013	-4.349	-2.446	-2.044	-1.873	-1.630	-1.652	-0.830
0.018	-2.412	-2.141	-1.837	-1.711	-1.664	-1.684	-0.882
0.025	-3.988	-3.077	-2.647	-2.587	-2.495	-2.533	-0.828
0.035	-2.330	-1.997	-1.802	-1.731	-1.624	-1.642	-0.740
0.050	-2.116	-2.093	-1.972	-1.824	-1.688	-1.658	-0.629
0.075	-2.151	-1.992	-1.859	-1.741	-1.758	-1.569	-0.546
0.100	-1.886	-1.971	-1.892	-1.781	-1.727	-1.498	-0.465
0.150	-1.544	-1.692	-1.689	-1.639	-1.621	-1.538	-0.414
0.200	-1.059	-1.220	-1.334	-1.385	-1.355	-1.283	-0.384
0.260	-0.909	-1.081	-1.234	-1.284	-1.264	-1.234	-0.361
0.320	-0.760	-0.828	-0.923	-1.016	-1.096	-1.129	-0.342
0.380	-0.703	-0.692	-0.766	-0.849	-0.940	-1.020	-0.341
0.440	-0.588	-0.605	-0.678	-0.755	-0.827	-0.909	-0.324
0.500	-0.571	-0.568	-0.593	-0.647	-0.722	-0.798	-0.317
0.560	-0.500	-0.486	-0.508	-0.555	-0.626	-0.681	-0.313
0.620	-0.459	-0.450	-0.456	-0.499	-0.543	-0.624	-0.295
0.680	-0.418	-0.388	-0.405	-0.436	-0.481	-0.553	-0.286
0.740	-0.371	-0.347	-0.353	-0.381	-0.408	-0.483	-0.268
0.800	-0.304	-0.294	-0.308	-0.333	-0.371	-0.426	-0.252
0.850	-0.267	-0.256	-0.269	-0.293	-0.328	-0.385	-0.237
0.900	-0.211	-0.215	-0.231	-0.257	-0.296	-0.358	-0.210
0.950	-0.137	-0.160	-0.195	-0.222	-0.267	-0.310	-0.143
0.980	-0.117	-0.138	-0.174	-0.208	-0.249	-0.307	-0.091
1.000	-0.089	-0.155	-0.197	-0.226	-0.265	-0.305	-0.048
Lower surface							
0.000	-0.087	-0.038	0.000	-0.002	-0.019	-0.020	1.040
0.002	0.954	0.950	0.956	0.955	0.940	0.930	0.497
0.006	1.039	1.038	1.038	1.040	1.040	1.039	-0.039
0.011	0.977	0.970	0.977	0.986	0.984	1.000	-0.191
0.017	0.902	0.892	0.894	0.904	0.907	0.904	-0.255
0.027	0.761	0.761	0.766	0.777	0.783	0.795	-0.281
0.050	0.609	0.597	0.605	0.616	0.621	0.630	-0.247
0.100	0.409	0.408	0.417	0.429	0.433	0.441	-0.235
0.150	0.297	0.301	0.305	0.312	0.323	0.323	-0.242
0.200	0.222	0.230	0.236	0.239	0.241	0.243	-0.232
0.280	0.134	0.129	0.130	0.138	0.139	0.134	-0.262
0.360	0.047	0.041	0.045	0.051	0.045	0.041	-0.288
0.440	-0.007	-0.015	-0.014	-0.016	-0.017	-0.025	-0.289
0.520	0.001	-0.011	-0.018	-0.019	-0.022	-0.030	-0.224
0.600	0.100	0.086	0.083	0.074	0.075	0.058	-0.062
0.680	0.188	0.175	0.169	0.160	0.152	0.139	0.065
0.740	0.240	0.231	0.220	0.219	0.205	0.191	0.143
0.800	0.272	0.253	0.250	0.243	0.223	0.214	0.192
0.850	0.284	0.270	0.258	0.249	0.233	0.223	0.219
0.900	0.251	0.239	0.218	0.205	0.187	0.168	0.207
0.950	0.178	0.161	0.142	0.129	0.098	0.072	0.160
0.980	0.050	0.007	-0.019	-0.048	-8.899	-0.104	0.054
1.000	-0.089	-0.155	-0.197	-0.226	-0.265	-0.305	-0.048

Table 4 (continued)

M = 0.5

α	-0.82	0.18	0.68	0.93	1.18	2.18	3.18	4.18	5.18	6.18
C_L	0.056	0.184	0.245	0.275	0.305	0.432	0.553	0.681	0.804	0.898
C_M	-0.077	-0.078	-0.079	-0.079	-0.080	-0.080	-0.081	-0.080	-0.076	-0.070
C_D	0.011	0.0112	0.011	0.0114	0.0114	0.0118	0.0122	0.0134		

C_p

x/c										
Upper surface										
0.000	1.029	1.063	1.063	1.061	1.055	1.000	0.895	0.750	0.581	0.439
0.002	0.826	0.642	0.528	0.469	0.406	0.119	-0.210	-0.553	-0.858	-1.074
0.005	0.500	0.237	0.084	0.008	-0.072	-0.440	-0.845	-1.250	-1.603	-1.834
0.009	0.030	-0.319	-0.518	-0.620	-0.721	-1.198	-1.725	-2.239	-2.603	-2.788
0.013	-0.251	-0.620	-0.828	-0.933	-1.043	-1.544	-2.137	-2.731	-3.106	-2.789
0.018	-0.364	-0.705	-0.898	-0.992	-1.093	-1.538	-2.051	-2.634	-3.007	-2.756
0.025	-0.392	-0.689	-0.853	-0.936	-1.024	-1.398	-1.840	-2.501	-2.968	-2.671
0.035	-0.384	-0.633	-0.770	-0.837	-0.910	-1.235	-1.750	-2.420	-2.933	-2.769
0.050	-0.339	-0.543	-0.654	-0.709	-0.769	-1.092	-1.044	-1.292	-2.023	-2.382
0.075	-0.319	-0.485	-0.572	-0.615	-0.663	-0.775	-0.977	-1.163	-1.362	-1.999
0.100	-0.291	-0.434	-0.492	-0.519	-0.535	-0.707	-0.860	-1.019	-1.158	-1.701
0.150	-0.276	-0.377	-0.431	-0.459	-0.488	-0.608	-0.725	-0.847	-0.988	-1.370
0.200	-0.269	-0.356	-0.402	-0.424	-0.449	-0.545	-0.641	-0.740	-0.836	-0.920
0.260	-0.264	-0.339	-0.377	-0.396	-0.418	-0.496	-0.577	-0.659	-0.735	-0.789
0.320	-0.264	-0.327	-0.360	-0.375	-0.393	-0.462	-0.528	-0.598	-0.664	-0.702
0.380	-0.272	-0.328	-0.357	-0.372	-0.386	-0.445	-0.504	-0.563	-0.618	-0.653
0.440	-0.267	-0.318	-0.344	-0.356	-0.370	-0.420	-0.472	-0.524	-0.570	-0.595
0.500	-0.268	-0.311	-0.334	-0.345	-0.357	-0.400	-0.448	-0.491	-0.529	-0.547
0.560	-0.272	-0.310	-0.333	-0.342	-0.352	-0.392	-0.429	-0.467	-0.498	-0.513
0.620	-0.264	-0.298	-0.318	-0.325	-0.334	-0.366	-0.399	-0.431	-0.457	-0.464
0.680	-0.260	-0.288	-0.305	-0.312	-0.321	-0.349	-0.374	-0.401	-0.419	-0.421
0.740	-0.245	-0.270	-0.285	-0.290	-0.297	-0.320	-0.342	-0.361	-0.374	-0.371
0.800	-0.234	-0.253	-0.265	-0.271	-0.276	-0.292	-0.311	-0.324	-0.332	-0.324
0.850	-0.225	-0.241	-0.250	-0.255	-0.259	-0.272	-0.282	-0.292	-0.290	-0.279
0.900	-0.200	-0.212	-0.217	-0.220	-0.224	-0.231	-0.238	-0.241	-0.235	-0.226
0.950	-0.157	-0.143	-0.149	-0.149	-0.150	-0.153	-0.154	-0.155	-0.149	-0.148
0.980	-0.084	-0.086	-0.090	-0.091	-0.094	-0.092	-0.093	-0.094	-0.094	-0.102
1.000	-0.057	-0.040	-0.043	-0.043	-0.045	-0.046	-0.048	-0.050	-0.060	-0.084
Lower surface										
0.000	1.029	1.063	1.063	1.061	1.055	1.000	0.895	0.750	0.581	0.439
0.002	0.032	0.378	0.517	0.577	0.632	0.830	0.968	1.042	1.064	1.059
0.006	-0.676	-0.236	-0.047	0.039	0.119	0.420	0.655	0.830	0.948	1.008
0.011	-0.762	-0.376	-0.206	-0.127	-0.053	0.229	0.463	0.651	0.792	0.879
0.017	-0.770	-0.429	-0.278	-0.206	-0.140	0.118	0.337	0.520	0.665	0.762
0.027	-0.701	-0.427	-0.303	-0.246	-0.189	0.029	0.221	0.388	0.530	0.625
0.050	-0.559	-0.359	-0.268	-0.225	-0.183	-0.016	0.134	0.271	0.387	0.473
0.100	-0.442	-0.302	-0.245	-0.216	-0.188	-0.071	0.041	0.142	0.238	0.308
0.150	-0.414	-0.310	-0.260	-0.236	-0.213	-0.114	-0.021	0.065	0.145	0.206
0.200	-0.383	-0.293	-0.254	-0.233	-0.217	-0.130	-0.049	0.023	0.094	0.149
0.280	-0.381	-0.309	-0.276	-0.259	-0.244	-0.174	-0.107	-0.044	0.013	0.060
0.360	-0.394	-0.332	-0.305	-0.290	-0.277	-0.217	-0.160	-0.105	-0.055	-0.015
0.440	-0.382	-0.329	-0.307	-0.296	-0.284	-0.234	-0.185	-0.138	-0.097	-0.065
0.520	-0.292	-0.254	-0.234	-0.226	-0.218	-0.179	-0.141	-0.101	-0.068	-0.045
0.600	-0.107	-0.076	-0.064	-0.057	-0.052	-0.022	0.004	0.032	0.056	0.073
0.680	0.037	0.061	0.070	0.075	0.079	0.102	0.122	0.142	0.163	0.172
0.740	0.121	0.143	0.150	0.154	0.157	0.177	0.194	0.211	0.228	0.235
0.800	0.178	0.195	0.203	0.206	0.209	0.224	0.240	0.254	0.266	0.271
0.850	0.209	0.225	0.231	0.234	0.235	0.250	0.264	0.276	0.286	0.289
0.900	0.201	0.213	0.218	0.222	0.223	0.234	0.245	0.255	0.261	0.261
0.950	0.157	0.168	0.170	0.171	0.172	0.181	0.190	0.196	0.202	0.197
0.980	0.054	0.063	0.062	0.059	0.062	0.066	0.070	0.075	0.074	0.062
1.000	-0.037	-0.040	-0.043	-0.043	-0.045	-0.046	-0.048	-0.050	-0.060	-0.084

M = 0.5

α	7.18	8.18	8.68	9.18	10.18	10.68	11.18	11.68
C_L	0.957	0.997	1.014	1.027	1.046	1.050	1.064	1.072
C_M	-0.067	-0.074	-0.083	-0.094	-0.123	-0.135	-0.152	-0.163

C_p

x/c								
Upper surface								
0.000	0.356	0.294	0.277	0.262	0.248	0.242	0.216	0.196
0.002	-1.097	-1.096	-1.075	-1.081	-1.055	-1.139	-1.254	-1.330
0.005	-1.962	-2.031	-2.029	-1.957	-1.736	-1.499	-1.274	-1.159
0.009	-2.316	-2.031	-1.950	-1.927	-1.746	-1.958	-2.186	-2.394
0.013	-2.792	-2.619	-2.409	-2.144	-1.666	-1.387	-1.089	-0.899
0.018	-2.016	-1.740	-1.633	-1.623	-1.515	-1.670	-1.941	-2.037
0.025	-2.859	-2.691	-2.530	-2.322	-2.020	-1.867	-1.701	-1.654
0.035	-2.080	-1.759	-1.664	-1.614	-1.470	-1.590	-1.743	-1.885
0.050	-2.297	-2.065	-1.994	-1.868	-1.575	-1.530	-1.480	-1.426
0.075	-1.992	-1.784	-1.701	-1.658	-1.472	-1.679	-1.610	-1.704
0.100	-1.809	-1.788	-1.759	-1.684	-1.425	-1.247	-1.059	-0.916
0.150	-1.651	-1.669	-1.625	-1.550	-1.478	-1.414	-1.497	-1.478
0.200	-1.171	-1.339	-1.356	-1.320	-1.221	-1.166	-1.028	-0.982
0.260	-1.027	-1.267	-1.305	-1.293	-1.214	-1.089	-1.050	-0.992
0.320	-0.804	-0.942	-0.995	-1.064	-1.082	-1.094	-1.042	-0.987
0.380	-0.697	-0.791	-0.843	-0.900	-0.995	-1.013	-1.017	-0.969
0.440	-0.601	-0.700	-0.764	-0.836	-0.942	-0.917	-0.914	-0.948
0.500	-0.562	-0.611	-0.655	-0.709	-0.847	-0.887	-0.939	-0.940
0.560	-0.499	-0.533	-0.585	-0.638	-0.749	-0.786	-0.827	-0.875
0.620	-0.455	-0.472	-0.511	-0.554	-0.677	-0.756	-0.831	-0.882
0.680	-0.405	-0.417	-0.448	-0.495	-0.625	-0.692	-0.768	-0.837
0.740	-0.358	-0.372	-0.399	-0.437	-0.585	-0.639	-0.753	-0.824
0.800	-0.305	-0.313	-0.345	-0.383	-0.500	-0.579	-0.668	-0.761
0.850	-0.265	-0.280	-0.310	-0.348	-0.467	-0.542	-0.640	-0.710
0.900	-0.222	-0.243	-0.274	-0.311	-0.422	-0.477	-0.564	-0.639
0.950	-0.161	-0.210	-0.246	-0.288	-0.390	-0.467	-0.555	-0.630
0.980	-0.135	-0.186	-0.224	-0.263	-0.357	-0.426	-0.503	-0.579
1.000	-0.130	-0.200	-0.240	-0.277	-0.370	-0.412	-0.489	-0.533
Lower surface								
0.000	0.356	0.294	0.277	0.262	0.248	0.242	0.216	0.196
0.002	1.050	1.038	1.031	1.026	1.018	1.009	0.996	0.990
0.006	1.036	1.048	1.052	1.056	1.057	1.058	1.059	1.060
0.011	0.921	0.949	0.958	0.969	0.983	0.985	0.999	1.005
0.017	0.818	0.853	0.866	0.876	0.884	0.887	0.878	0.892
0.027	0.680	0.727	0.733	0.748	0.766	0.773	0.784	0.793
0.050	0.516	0.564	0.576	0.588	0.599	0.610	0.600	0.605
0.100	0.351	0.384	0.395	0.407	0.420	0.421	0.437	0.439
0.150	0.245	0.273	0.281	0.292	0.303	0.304	0.309	0.313
0.200	0.181	0.204	0.212	0.221	0.226	0.227	0.234	0.237
0.280	0.085	0.103	0.108	0.112	0.115	0.111	0.110	0.109
0.360	0.004	0.016	0.018	0.020	0.017	0.013	0.009	0.005
0.440	-0.051	-0.044	-0.045	-0.046	-0.058	-0.065	-0.073	-0.077
0.520	-0.036	-0.037	-0.041	-0.045	-0.058	-0.070	-0.081	-0.092
0.600	0.075	0.070	0.064	0.057	0.039	0.028	0.020	0.002
0.680	0.171	0.162	0.154	0.147	0.126	0.115	0.099	0.088
0.740	0.231	0.218	0.210	0.202	0.182	0.167	0.153	0.140
0.800	0.265	0.249	0.241	0.231	0.205	0.188	0.175	0.157
0.850	0.281	0.264	0.252	0.243	0.212	0.195	0.179	0.164
0.900	0.250	0.225	0.210	0.195	0.159	0.140	0.114	0.094
0.950	0.178	0.149	0.127	0.107	0.061	0.031	0.004	-0.022
0.980	0.035	-0.012	-0.038	-0.066	-0.136	-0.174	-0.217	-0.264
1.000	-0.130	-0.200	-0.240	-0.277	-0.370	-0.412	-0.489	-0.533

Table 4 (continued)

M = 0.6

α	-0.82	0.18	0.68	0.93	1.18	2.18	3.18	4.18	4.68	5.18
C_L	0.054	0.190	0.261	0.296	0.334	0.470	0.594	0.729	0.797	0.850
C_M	-0.083	-0.084	-0.085	-0.086	-0.086	-0.086	-0.084	-0.079	-0.078	-0.075
C_D	0.0112		0.0113	0.0113	0.0114	0.0120	0.0139	0.0194		

C_p

x/c										
Upper surface										
0.000	1.058	1.092	1.092	1.091	1.086	1.045	0.972	0.881	0.832	0.786
0.002	0.866	0.698	0.593	0.542	0.471	0.247	0.021	-0.181	-0.270	-0.350
0.005	0.549	0.305	0.164	0.094	0.001	-0.281	-0.542	-0.762	-0.869	-0.955
0.009	0.076	-0.258	-0.452	-0.546	-0.672	-1.040	-1.343	-1.568	-1.662	-1.728
0.013	-0.224	-0.597	-0.815	-0.925	-1.078	-1.506	-1.789	-1.994	-2.087	-2.164
0.018	-0.353	-0.710	-0.924	-1.031	-1.179	-1.720	-2.099	-2.335	-2.430	-2.496
0.025	-0.393	-0.715	-0.908	-1.001	-1.131	-1.590	-2.143	-2.469	-2.492	-2.360
0.035	-0.391	-0.663	-0.823	-0.901	-1.007	-1.484	-2.027	-2.314	-2.388	-2.349
0.050	-0.350	-0.572	-0.702	-0.766	-0.858	-1.347	-2.019	-2.312	-2.400	-2.369
0.075	-0.321	-0.513	-0.618	-0.666	-0.738	-0.833	-0.914	-1.873	-2.054	-2.055
0.100	-0.286	-0.442	-0.516	-0.546	-0.581	-0.766	-0.869	-1.294	-1.604	-1.767
0.150	-0.293	-0.407	-0.469	-0.497	-0.538	-0.660	-0.773	-0.862	-1.067	-1.353
0.200	-0.288	-0.384	-0.436	-0.461	-0.493	-0.594	-0.695	-0.765	-0.828	-1.025
0.260	-0.284	-0.372	-0.409	-0.429	-0.458	-0.540	-0.625	-0.700	-0.722	-0.802
0.320	-0.282	-0.353	-0.390	-0.408	-0.431	-0.503	-0.576	-0.637	-0.659	-0.692
0.380	-0.294	-0.355	-0.390	-0.403	-0.424	-0.487	-0.548	-0.601	-0.621	-0.639
0.440	-0.290	-0.345	-0.374	-0.425	-0.405	-0.460	-0.514	-0.558	-0.577	-0.589
0.500	-0.289	-0.338	-0.365	-0.375	-0.392	-0.437	-0.487	-0.524	-0.538	-0.544
0.560	-0.293	-0.339	-0.360	-0.370	-0.386	-0.427	-0.467	-0.499	-0.512	-0.516
0.620	-0.285	-0.325	-0.343	-0.353	-0.366	-0.399	-0.434	-0.457	-0.467	-0.469
0.680	-0.281	-0.315	-0.331	-0.338	-0.350	-0.377	-0.405	-0.425	-0.432	-0.430
0.740	-0.266	-0.293	-0.308	-0.314	-0.323	-0.346	-0.368	-0.381	-0.385	-0.381
0.800	-0.253	-0.276	-0.287	-0.294	-0.300	-0.316	-0.330	-0.337	-0.340	-0.334
0.850	-0.243	-0.259	-0.268	-0.273	-0.280	-0.289	-0.297	-0.299	-0.298	-0.290
0.900	-0.214	-0.226	-0.233	-0.235	-0.239	-0.244	-0.247	-0.243	-0.243	-0.235
0.950	-0.145	-0.151	-0.154	-0.156	-0.158	-0.159	-0.156	-0.157	-0.159	-0.159
0.980	-0.085	-0.090	-0.090	-0.093	-0.093	-0.093	-0.091	-0.095	-0.103	-0.110
1.000	-0.036	-0.039	-0.039	-0.041	-0.044	-0.045	-0.053	-0.060	-0.068	-0.087
Lower surface										
0.000	1.058	1.092	1.092	1.091	1.086	1.045	0.972	0.881	0.832	0.786
0.002	0.078	0.390	0.539	0.598	0.669	0.841	0.966	1.043	1.067	1.080
0.006	-0.689	-0.242	-0.043	0.040	0.144	0.420	0.533	0.795	0.856	0.900
0.011	-0.811	-0.401	-0.216	-0.138	-0.039	0.226	0.442	0.613	0.682	0.734
0.017	-0.841	-0.465	-0.296	-0.225	-0.134	0.113	0.321	0.488	0.556	0.611
0.027	-0.771	-0.469	-0.328	-0.267	-0.192	0.022	0.204	0.361	0.427	0.480
0.050	-0.615	-0.396	-0.289	-0.245	-0.188	-0.022	0.121	0.254	0.306	0.352
0.100	-0.476	-0.340	-0.269	-0.237	-0.199	-0.079	0.026	0.129	0.174	0.212
0.150	-0.459	-0.343	-0.282	-0.258	-0.226	-0.125	-0.034	0.053	0.090	0.122
0.200	-0.422	-0.326	-0.277	-0.255	-0.228	-0.141	-0.062	0.011	0.046	0.074
0.280	-0.422	-0.343	-0.303	-0.284	-0.263	-0.189	-0.126	-0.058	-0.031	-0.008
0.360	-0.434	-0.369	-0.333	-0.319	-0.299	-0.237	-0.187	-0.125	-0.100	-0.080
0.440	-0.419	-0.365	-0.335	-0.323	-0.309	-0.256	-0.215	-0.162	-0.140	-0.125
0.520	-0.316	-0.277	-0.253	-0.244	-0.233	-0.193	-0.161	-0.121	-0.103	-0.093
0.600	-0.112	-0.083	-0.067	-0.060	-0.052	-0.023	0.000	0.028	0.039	0.046
0.680	0.042	0.064	0.077	0.082	0.086	0.109	0.127	0.147	0.156	0.159
0.740	0.130	0.150	0.159	0.165	0.169	0.189	0.203	0.218	0.226	0.229
0.800	0.189	0.205	0.215	0.219	0.222	0.239	0.250	0.264	0.269	0.270
0.850	0.221	0.236	0.244	0.247	0.251	0.265	0.274	0.286	0.292	0.291
0.900	0.214	0.226	0.233	0.236	0.236	0.250	0.259	0.265	0.268	0.265
0.950	0.170	0.178	0.183	0.186	0.186	0.195	0.201	0.204	0.208	0.201
0.980	0.066	0.068	0.071	0.073	0.069	0.078	0.079	0.073	0.080	0.068
1.000	-0.036	-0.039	-0.039	-0.041	-0.044	-0.045	-0.053	-0.060	-0.068	-0.087

M = 0.6 M = 0.64

α	6.18	7.18	7.68	8.18	5.18	6.18	7.18
C_L	0.929	0.975	0.992	0.997	0.942	1.080	0.992
C_M	-0.073	-0.082	-0.090	-0.101	-0.076	-0.073	-0.089

C_p

x/c							
Upper surface							
0.000	0.705	0.649	0.627	0.609	0.847	0.765	0.751
0.002	-0.481	-0.557	-0.584	-0.588	-0.194	-0.341	-0.346
0.005	-1.089	-1.173	-1.206	-1.238	0.751	-0.902	-0.911
0.009	-1.843	-1.890	-1.883	-1.797	-1.459	-1.583	-1.592
0.013	-2.263	-1.996	-1.946	-2.000	-1.863	-1.998	-1.895
0.018	-2.312	-1.945	-1.822	-1.631	-2.170	-2.280	-2.107
0.025	-2.193	-2.111	-2.095	-2.191	-2.373	-2.487	-2.285
0.035	-2.315	-1.922	-1.821	-1.637	-2.462	-2.541	-2.016
0.050	-2.197	-2.076	-1.997	-1.991	-2.448	-2.575	-2.249
0.075	-2.009	-1.854	-1.774	-1.589	-2.383	-2.522	-2.104
0.100	-1.851	-1.770	-1.722	-1.688	-2.311	-2.334	-1.705
0.150	-1.577	-1.623	-1.593	-1.486	-2.123	-2.126	-1.591
0.200	-1.339	-1.387	-1.381	-1.296	-1.584	-2.081	-1.335
0.260	-1.046	-1.240	-1.269	-1.274	-0.656	-1.184	-1.248
0.320	-0.863	-1.022	-1.065	-1.053	-0.591	-0.816	-1.065
0.380	-0.729	-0.876	-0.927	-0.926	-0.603	-0.662	-0.959
0.440	-0.659	-0.744	-0.799	-0.845	-0.585	-0.565	-0.798
0.500	-0.566	-0.645	-0.694	-0.728	-0.559	-0.548	-0.701
0.560	-0.523	-0.573	-0.617	-0.683	-0.537	-0.534	-0.617
0.620	-0.465	-0.495	-0.534	-0.593	-0.498	-0.498	-0.540
0.680	-0.420	-0.442	-0.475	-0.517	-0.460	-0.461	-0.478
0.740	-0.367	-0.384	-0.417	-0.457	-0.413	-0.415	-0.419
0.800	-0.318	-0.333	-0.366	-0.411	-0.366	-0.369	-0.363
0.850	-0.275	-0.292	-0.325	-0.368	-0.324	-0.327	-0.322
0.900	-0.229	-0.258	-0.293	-0.333	-0.266	-0.270	-0.289
0.950	-0.172	-0.216	-0.255	-0.299	-0.178	-0.184	-0.250
0.980	-0.138	-0.194	-0.240	-0.283	-0.113	-0.126	-0.233
1.000	-0.134	-0.202	-0.252	-0.293	-0.066	-0.084	-0.238
Lower surface							
0.000	0.705	0.649	0.627	0.609	0.847	0.765	0.751
0.002	1.092	1.093	1.092	1.092	1.086	1.104	1.103
0.006	0.965	1.000	1.013	1.023	0.894	0.974	0.976
0.011	0.815	0.863	0.876	0.893	0.727	0.823	0.828
0.017	0.694	0.746	0.764	0.784	0.605	0.708	0.710
0.027	0.563	0.614	0.633	0.652	0.478	0.578	0.580
0.050	0.423	0.470	0.487	0.504	0.354	0.434	0.442
0.100	0.270	0.309	0.320	0.335	0.217	0.288	0.286
0.150	0.173	0.205	0.213	0.228	0.128	0.194	0.185
0.200	0.117	0.144	0.150	0.161	0.080	0.137	0.124
0.280	0.025	0.047	0.052	0.059	-0.002	0.046	0.026
0.360	-0.051	-0.038	-0.036	-0.031	-0.076	-0.034	-0.061
0.440	-0.104	-0.095	-0.099	-0.101	-0.122	-0.095	-0.122
0.520	-0.079	-0.079	-0.084	-0.088	-0.087	-0.059	-0.101
0.600	0.052	0.047	0.039	0.034	0.055	0.074	0.051
0.680	0.161	0.152	0.144	0.136	0.172	0.179	0.142
0.740	0.227	0.216	0.207	0.197	0.242	0.251	0.209
0.800	0.268	0.252	0.242	0.232	0.286	0.293	0.247
0.850	0.286	0.270	0.258	0.246	0.307	0.307	0.264
0.900	0.256	0.232	0.217	0.203	0.283	0.287	0.227
0.950	0.187	0.154	0.133	0.115	0.220	0.218	0.142
0.980	0.044	-0.001	-0.034	-0.063	0.086	0.076	-0.019
1.000	-0.134	-0.202	-0.252	-0.293	-0.066	-0.084	-0.238

Table 4 (continued)

M = 0.65

α	4.68	5.18	5.68	6.18	6.88	7.18
c_L	0.885	0.981	1.053	1.135	1.184	1.002
c_H	-0.080	-0.077	-0.076	-0.076	-0.076	-0.092

c_p

x/c						
Upper surface						
0.000	0.903	0.863	0.822	0.785	0.753	0.775
0.002	-0.080	-0.155	-0.226	-0.285	-0.333	-0.295
0.005	-0.620	-0.699	-0.773	-0.836	-0.888	-0.851
0.009	-1.336	-1.404	-1.465	-1.511	-1.551	-1.523
0.013	-1.723	-1.794	-1.858	-1.915	-1.962	-1.854
0.018	-2.052	-2.117	-2.174	-2.219	-2.254	-2.080
0.025	-2.234	-2.297	-2.355	-2.399	-2.435	-2.292
0.035	-2.322	-2.385	-2.444	-2.487	-2.523	-2.071
0.050	-2.304	-2.375	-2.439	-2.487	-2.526	-2.272
0.075	-2.239	-2.315	-2.383	-2.436	-2.476	-2.190
0.100	-2.180	-2.260	-2.331	-2.384	-2.427	-1.747
0.150	-2.039	-2.158	-2.245	-2.303	-2.348	-1.584
0.200	-1.219	-2.060	-2.142	-2.213	-2.267	-1.328
0.260	-0.586	-0.891	-1.430	-2.031	-2.164	-1.239
0.320	-0.572	-0.548	-0.699	-0.984	-1.160	-1.069
0.380	-0.596	-0.565	-0.547	-0.632	-0.780	-0.969
0.440	-0.577	-0.560	-0.538	-0.531	-0.578	-0.821
0.500	-0.555	-0.548	-0.535	-0.517	-0.517	-0.721
0.560	-0.536	-0.536	-0.529	-0.519	-0.519	-0.646
0.620	-0.497	-0.499	-0.496	-0.489	-0.485	-0.561
0.680	-0.461	-0.465	-0.465	-0.461	-0.460	-0.499
0.740	-0.415	-0.420	-0.420	-0.417	-0.418	-0.434
0.800	-0.371	-0.373	-0.375	-0.373	-0.375	-0.382
0.850	-0.329	-0.332	-0.334	-0.333	-0.336	-0.343
0.900	-0.271	-0.275	-0.276	-0.276	-0.281	-0.304
0.950	-0.227	-0.227	-0.228	-0.227	-0.230	-0.265
0.980	-0.111	-0.117	-0.123	-0.128	-0.078	-0.245
1.000	-0.074	-0.074	-0.075	-0.074	1.110	-0.252
Lower surface						
0.000	0.903	0.863	0.822	0.785	0.753	0.775
0.002	1.067	1.087	1.099	1.105	1.109	1.105
0.006	0.837	0.890	0.931	0.964	0.986	0.969
0.011	0.664	0.725	0.774	0.815	0.843	0.819
0.017	0.541	0.603	0.654	0.696	0.727	0.704
0.027	0.417	0.479	0.526	0.568	0.600	0.573
0.050	0.303	0.359	0.398	0.437	0.463	0.436
0.100	0.173	0.215	0.252	0.284	0.308	0.282
0.150	0.090	0.127	0.160	0.189	0.208	0.180
0.200	0.045	0.079	0.108	0.132	0.150	0.119
0.280	-0.032	-0.005	0.021	0.042	0.056	0.021
0.360	-0.104	-0.078	-0.057	-0.039	-0.027	-0.067
0.440	-0.146	-0.125	-0.106	-0.092	-0.083	-0.129
0.520	-0.106	-0.090	-0.075	-0.065	-0.060	-0.108
0.600	0.044	0.055	0.064	0.071	0.073	0.027
0.680	0.165	0.172	0.179	0.183	0.184	0.139
0.760	0.258	0.264	0.268	0.252	0.251	0.206
0.800	0.282	0.287	0.290	0.293	0.292	0.245
0.850	0.306	0.309	0.312	0.313	0.311	0.261
0.900	0.282	0.284	0.287	0.285	0.283	0.224
0.950	0.220	0.221	0.221	0.219	0.214	0.140
0.980	0.087	0.086	0.083	0.079	0.074	-0.024
1.000	-0.074	-0.074	-0.075	-0.074	1.110	-0.252

M = 0.66

α	4.68	5.18	6.18	7.18
c_L	0.914	1.004	1.154	1.222
c_H	-0.079	-0.078	-0.080	-0.084

M = 0.68

α	4.68	5.18	6.18	7.18
c_L	0.967	1.073	1.214	1.240
c_H	-0.084	-0.088	-0.098	-0.099

c_p

x/c									
Upper surface									
0.000	0.920	0.881	0.806	0.747		0.952	0.918	0.862	0.814
0.002	-0.038	-0.110	-0.238	-0.329		0.038	-0.023	-0.121	-0.202
0.005	-0.568	-0.644	-0.778	-0.874		-0.472	-0.538	-0.641	-0.725
0.009	-1.268	-1.338	-1.462	-1.511		-1.148	-1.201	-1.289	-1.353
0.013	-1.650	-1.716	-1.838	-1.926		-1.517	-1.575	-1.667	-1.743
0.018	-1.957	-2.019	-2.123	-2.183		-1.814	-1.867	-1.940	-2.004
0.025	-2.151	-2.209	-2.314	-2.376		-2.003	-2.055	-2.132	-2.190
0.035	-2.239	-2.299	-2.401	-2.462		-2.091	-2.143	-2.219	-2.277
0.050	-2.223	-2.290	-2.402	-2.469		-2.079	-2.137	-2.221	-2.284
0.075	-2.164	-2.235	-2.355	-2.426		-2.030	-2.092	-2.179	-2.245
0.100	-2.113	-2.185	-2.308	-2.380		-1.989	-2.051	-2.140	-2.206
0.150	-2.021	-2.105	-2.235	-2.309		-1.921	-1.987	-2.078	-2.146
0.200	-1.908	-2.015	-2.167	-2.207		-1.849	-1.929	-2.024	-2.094
0.260	-0.788	-1.648	-2.090	-2.137		-1.812	-1.886	-1.984	-2.048
0.320	-0.518	-0.852	-1.431	-1.998		-1.076	-1.829	-1.956	-1.972
0.380	-0.556	-0.516	-0.837	-1.012		-0.569	-1.010	-1.850	-1.391
0.440	-0.554	-0.522	-0.550	-0.751		-0.434	-0.506	-0.975	-0.962
0.500	-0.544	-0.524	-0.481	-0.588		-0.469	-0.427	-0.600	-0.723
0.560	-0.532	-0.512	-0.491	-0.536		-0.494	-0.457	-0.441	-0.562
0.620	-0.497	-0.491	-0.470	-0.485		-0.478	-0.452	-0.413	-0.481
0.680	-0.464	-0.462	-0.450	-0.463		-0.456	-0.440	-0.415	-0.460
0.740	-0.419	-0.418	-0.414	-0.424		-0.420	-0.411	-0.403	-0.431
0.800	-0.375	-0.375	-0.374	-0.385		-0.379	-0.375	-0.372	-0.404
0.850	-0.333	-0.336	-0.336	-0.345		-0.342	-0.341	-0.343	-0.363
0.900	-0.276	-0.278	-0.283	-0.295		-0.287	-0.287	-0.296	-0.330
0.950	-0.183	-0.187	-0.195	-0.216		-0.192	-0.195	-0.211	-0.241
0.980	-0.114	-0.120	-0.134	-0.165		-0.120	-0.127	-0.145	-0.191
1.000	-0.062	-0.067	-0.088	-0.140		-0.064	-0.070	-0.093	-0.157
Lower surface									
0.000	0.920	0.881	0.806	0.747		0.952	0.918	0.862	0.814
0.002	1.066	1.086	1.107	1.112		1.061	1.082	1.105	1.115
0.006	0.827	0.880	0.956	1.001		0.812	0.861	0.949	0.973
0.011	0.654	0.712	0.805	0.861		0.637	0.693	0.772	0.827
0.017	0.532	0.591	0.688	0.748		0.516	0.573	0.655	0.713
0.027	0.408	0.467	0.560	0.620		0.395	0.449	0.529	0.585
0.050	0.297	0.350	0.430	0.485		0.287	0.333	0.404	0.458
0.100	0.169	0.211	0.280	0.336		0.162	0.202	0.259	0.301
0.150	0.087	0.124	0.184	0.222		0.081	0.114	0.166	0.200
0.200	0.043	0.076	0.128	0.154		0.037	0.068	0.112	0.138
0.280	-0.036	-0.006	0.047	0.064		-0.043	-0.015	0.020	0.039
0.360	-0.107	-0.083	-0.043	-0.025		-0.115	-0.092	-0.061	-0.049
0.440	-0.151	-0.136	-0.097	-0.086		-0.159	-0.139	-0.115	-0.109
0.520	-0.109	-0.091	-0.069	-0.064		-0.115	-0.100	-0.086	-0.088
0.600	0.041	0.055	0.069	0.069		0.041	0.052	0.059	0.052
0.680	0.163	0.174	0.183	0.178		0.166	0.173	0.177	0.166
0.760	0.256	0.265	0.251	0.248		0.241	0.245	0.247	0.234
0.800	0.281	0.289	0.293	0.286		0.286	0.290	0.290	0.276
0.850	0.305	0.311	0.314	0.303		0.310	0.312	0.312	0.294
0.900	0.284	0.288	0.288	0.275		0.288	0.288	0.286	0.265
0.950	0.222	0.223	0.221	0.200		0.225	0.224	0.219	0.189
0.980	0.092	0.090	0.082	0.055		0.093	0.090	0.078	0.043
1.000	-0.062	-0.067	-0.088	-0.140		-0.064	-0.070	-0.093	-0.157

Table 4 (continued)

M = 0.7

α	-0.82	0.18	0.68	0.93	1.18	1.43	1.68	2.18	2.68	3.18
C_L	0.059	0.213	0.289	0.330	0.376	0.396	0.449	0.530	0.619	0.720
C_M	-0.092	-0.094	-0.095	-0.096	-0.096	-0.096	-0.095	-0.095	-0.093	-0.090
C_D	0.011	0.011	0.011	0.011	0.011	0.011		0.013	0.015	0.026

C_p

x/c										
Upper surface										
0.000	1.1008	1.1269	1.1282	1.1278	1.1261	1.124	1.119	1.1047	1.083	1.0628
0.002	0.9011	0.7597	0.6830	0.6413	0.5918	0.574	0.535	0.4454	0.383	0.3025
0.005	0.5890	0.3851	0.2808	0.2267	0.1653	0.137	0.085	-0.0066	-0.089	-0.1664
0.009	0.1152	-0.1736	-0.3132	-0.3835	-0.4601	-0.488	-0.544	-0.6592	-0.739	-0.8305
0.013	-0.2111	-0.5524	-0.7095	-0.7962	-0.8777	-0.900	-0.953	-1.0631	-1.123	-1.2084
0.018	-0.3582	-0.7185	-0.9104	-1.0049	-1.1021	-1.128	-1.183	-1.3124	-1.387	-1.4877
0.025	-0.4161	-0.7726	-0.9940	-1.1321	-1.2467	-1.286	-1.359	-1.4959	-1.586	-1.6739
0.035	-0.4227	-0.7368	-0.9316	-1.0710	-1.2650	-1.342	-1.445	-1.5798	-1.667	-1.7557
0.050	-0.3832	-0.6386	-0.7932	-0.9060	-1.0843	-1.146	-1.324	-1.5329	-1.632	-1.7262
0.075	-0.3557	-0.5795	-0.7008	-0.7771	-0.9721	-1.047	-1.188	-1.4702	-1.577	-1.6793
0.100	-0.3215	-0.4741	-0.5880	-0.6128	-0.5458	-0.532	-0.933	-1.4124	-1.537	-1.6431
0.150	-0.3319	-0.4646	-0.5293	-0.5658	-0.6087	-0.624	-0.635	-0.5752	-1.420	-1.5708
0.200	-0.3273	-0.4400	-0.4965	-0.5271	-0.5650	-0.578	-0.602	-0.5847	-0.609	-1.5055
0.260	-0.3232	-0.4216	-0.4673	-0.5000	-0.5275	-0.535	-0.559	-0.5960	-0.535	-0.6971
0.320	-0.3215	-0.4050	-0.4473	-0.4692	-0.4971	-0.507	-0.529	-0.5652	-0.558	-0.4669
0.380	-0.3332	-0.4079	-0.4448	-0.4638	-0.4888	-0.498	-0.518	-0.5569	-0.570	-0.5247
0.440	-0.3311	-0.3975	-0.4298	-0.4468	-0.4697	-0.477	-0.494	-0.5290	-0.547	-0.5326
0.500	-0.3303	-0.3896	-0.4182	-0.4330	-0.4518	-0.460	-0.474	-0.5065	-0.526	-0.5268
0.560	-0.3365	-0.3891	-0.4152	-0.4272	-0.4443	-0.451	-0.464	-0.4932	-0.512	-0.5214
0.620	-0.3273	-0.3729	-0.3948	-0.4064	-0.4197	-0.427	-0.435	-0.4608	-0.479	-0.4902
0.680	-0.3211	-0.3591	-0.3790	-0.3872	-0.3993	-0.403	-0.411	-0.4333	-0.448	-0.4615
0.740	-0.3019	-0.3341	-0.3503	-0.3572	-0.3668	-0.371	-0.377	-0.3942	-0.407	-0.4186
0.800	-0.2857	-0.3116	-0.3244	-0.3297	-0.3368	-0.340	-0.343	-0.3575	-0.367	-0.3782
0.850	-0.2686	-0.2899	-0.3007	-0.3043	-0.3093	-0.311	-0.314	-0.3230	-0.331	-0.3407
0.900	-0.2357	-0.2495	-0.2561	-0.2573	-0.2602	-0.261	-0.260	-0.2680	-0.273	-0.2840
0.950	-0.1527	-0.1598	-0.1631	-0.1631	-0.1643	-0.165	-0.164	-0.1672	-0.174	-0.1819
0.980	-0.0838	-0.0880	-0.0905	-0.0905	-0.0909	-0.091	-0.090	-0.0946	-0.097	-0.1055
1.000	-0.0292	-0.0342	-0.0371	-0.0371	-0.0392	-0.041	-0.041	-0.0446	-0.047	-0.0509
Lower surface										
0.000	1.1008	1.1269	1.1282	1.1278	1.1261	1.124	1.119	1.1047	1.083	1.0628
0.002	0.1955	0.4467	0.5609	0.6211	0.6862	0.710	0.754	0.8554	0.893	0.9486
0.006	-0.5889	-0.1990	-0.0325	0.0534	0.1469	0.184	0.256	0.3927	0.490	0.5882
0.011	-0.7811	-0.3871	-0.2223	-0.1376	-0.0454	-0.010	0.060	0.1995	0.297	0.4004
0.017	-0.9009	-0.4825	-0.3211	-0.2389	-0.1501	-0.115	-0.046	0.0859	0.182	0.2820
0.027	-0.8639	-0.5029	-0.3632	-0.2918	-0.2131	-0.183	-0.121	-0.0020	0.083	0.1766
0.050	-0.6883	-0.4804	-0.3253	-0.2702	-0.2097	-0.187	-0.138	-0.0404	0.028	0.1073
0.100	-0.5289	-0.3825	-0.3098	-0.2702	-0.2268	-0.208	-0.171	-0.1009	-0.044	0.0150
0.150	-0.5185	-0.3858	-0.3248	-0.2914	-0.2547	-0.240	-0.209	-0.1467	-0.099	-0.0467
0.200	-0.4844	-0.3733	-0.3211	-0.2918	-0.2610	-0.244	-0.217	-0.1688	-0.122	-0.0792
0.280	-0.4856	-0.3929	-0.3503	-0.3252	-0.2981	-0.287	-0.264	-0.2201	-0.185	-0.1439
0.360	-0.5056	-0.4262	-0.3890	-0.3672	-0.3452	-0.334	-0.313	-0.2747	-0.243	-0.2073
0.440	-0.4848	-0.4212	-0.3915	-0.3735	-0.3547	-0.346	-0.328	-0.2959	-0.269	-0.2394
0.520	-0.3490	-0.3062	-0.2853	-0.2723	-0.2593	-0.253	-0.240	-0.2168	-0.196	-0.1744
0.600	-0.1135	-0.0851	-0.0709	-0.0617	-0.0529	-0.049	-0.039	-0.0241	-0.009	0.0041
0.680	0.0513	0.0747	0.0856	0.0922	0.0997	0.102	0.110	0.1210	0.131	0.1428
0.740	0.1428	0.1642	0.1733	0.1791	0.1858	0.188	0.194	0.2037	0.213	0.2218
0.800	0.2013	0.2206	0.2306	0.2359	0.2401	0.242	0.248	0.2572	0.265	0.2724
0.850	0.2569	0.2532	0.2624	0.2665	0.2706	0.273	0.277	0.2856	0.292	0.2975
0.900	0.2314	0.2449	0.2523	0.2560	0.2585	0.260	0.264	0.2710	0.276	0.2795
0.950	0.1867	0.1964	0.2005	0.2042	0.2071	0.206	0.211	0.2146	0.218	0.2218
0.980	0.0801	0.0852	0.0864	0.0893	0.0901	0.089	0.092	0.0926	0.095	0.0952
1.000	-0.0292	-0.0342	-0.0371	-0.0371	-0.0392	-0.041	-0.041	-0.0446	-0.047	-0.0509

M = 0.7

α	3.68	4.18	4.68	5.18	6.18	7.18
C_L	0.829	0.941	1.063	1.155	1.266	1.313
C_M	-0.089	-0.093	-0.103	-0.116	-0.138	-0.132
C_D		0.038				

C_p

x/c						
Upper surface						
0.000	1.038	1.0119	0.985	0.960	0.916	0.871
0.002	0.244	0.1732	0.123	0.072	-0.007	-0.085
0.005	-0.242	-0.3051	-0.367	-0.423	-0.507	-0.589
0.009	-0.896	-0.9691	-1.021	-1.064	-1.140	-1.209
0.013	-1.261	-1.3276	-1.378	-1.426	-1.502	-1.576
0.018	-1.547	-1.6267	-1.666	-1.711	-1.774	-1.840
0.025	-1.739	-1.7996	-1.851	-1.893	-1.958	-2.021
0.035	-1.822	-1.8856	-1.938	-1.980	-2.045	-2.105
0.050	-1.801	-1.8698	-1.929	-1.976	-2.047	-2.113
0.075	-1.755	-1.8274	-1.886	-1.936	-2.009	-2.079
0.100	-1.722	-1.7954	-1.852	-1.903	-1.976	-2.045
0.150	-1.661	-1.7389	-1.799	-1.850	-1.924	-1.994
0.200	-1.600	-1.6803	-1.741	-1.804	-1.878	-1.950
0.260	-1.563	-1.6533	-1.718	-1.772	-1.848	-1.920
0.320	-0.811	-1.6163	-1.685	-1.748	-1.827	-1.897
0.380	-0.484	-0.8939	-1.678	-1.745	-1.823	-1.889
0.440	-0.458	-0.6252	-0.963	-1.283	-1.117	-1.871
0.500	-0.486	-0.4151	-0.754	-0.971	-1.115	-1.137
0.560	-0.500	-0.4421	-0.470	-0.832	-1.085	-0.925
0.620	-0.481	-0.4421	-0.400	-0.524	-0.918	-0.664
0.680	-0.457	-0.4371	-0.393	-0.377	-0.743	-0.472
0.740	-0.419	-0.4076	-0.378	-0.358	-0.468	-0.398
0.800	-0.380	-0.3739	-0.352	-0.309	-0.380	-0.367
0.850	-0.344	-0.3451	-0.326	-0.302	-0.277	-0.351
0.900	-0.287	-0.2901	-0.281	-0.273	-0.239	-0.330
0.950	-0.187	-0.1901	-0.186	-0.192	-0.199	-0.260
0.980	-0.110	-0.1180	-0.122	-0.126	-0.141	-0.199
1.000	-0.052	-0.0588	-0.068	-0.078	-0.137	-0.166
Lower surface						
0.000	1.038	1.0119	0.985	0.960	0.916	0.871
0.002	0.992	1.0266	1.054	1.073	1.097	1.115
0.006	0.667	0.7344	0.788	0.833	0.895	0.947
0.011	0.480	0.5557	0.612	0.660	0.733	0.794
0.017	0.361	0.4350	0.492	0.543	0.614	0.678
0.027	0.250	0.3191	0.374	0.422	0.491	0.552
0.050	0.166	0.2267	0.271	0.312	0.372	0.425
0.100	0.065	0.1118	0.150	0.185	0.233	0.275
0.150	-0.003	0.0379	0.071	0.100	0.142	0.177
0.200	-0.038	-0.0045	0.028	0.054	0.089	0.117
0.280	-0.109	-0.0771	-0.052	-0.029	-0.002	0.018
0.360	-0.176	-0.1493	-0.125	-0.107	-0.086	-0.073
0.440	-0.212	-0.1889	-0.170	-0.155	-0.141	-0.137
0.520	-0.154	-0.1368	-0.123	-0.113	-0.108	-0.112
0.600	0.018	0.0300	0.038	0.045	0.045	0.036
0.680	0.153	0.1607	0.167	0.171	0.166	0.156
0.740	0.231	0.2368	0.242	0.245	0.239	0.228
0.800	0.279	0.2853	0.289	0.290	0.284	0.270
0.850	0.305	0.3099	0.313	0.313	0.305	0.291
0.900	0.286	0.2890	0.291	0.290	0.277	0.262
0.950	0.225	0.2276	0.229	0.225	0.208	0.190
0.980	0.097	0.0960	0.096	0.091	0.064	0.038
1.000	-0.052	-0.0588	-0.068	-0.078	-0.137	-0.166

Table 4 (continued)

	M = 0.71					M = 0.72			
α	4.18	5.18	6.18	7.18	4.18	4.68	5.18	6.18	7.18
C_L	0.986	1.181	1.374	1.548	1.019	1.144	1.209	1.234	1.347
C_M	-0.103	-0.135	-0.151	-0.159	-0.119	-0.147	-0.164	-0.171	-0.177

C_p

x/c									
Upper surface									
0.000	1.026	0.980	0.939	0.899	1.044	1.022	1.005	0.969	0.926
0.002	0.218	0.123	0.043	-0.026	0.264	0.217	0.177	0.108	0.027
0.005	-0.260	-0.363	-0.444	-0.519	-0.201	-0.254	-0.297	-0.372	-0.456
0.009	-0.903	-1.001	-1.074	-1.138	-0.834	-0.886	-0.921	-0.994	-1.068
0.013	-1.258	-1.353	-1.427	-1.493	-1.189	-1.233	-1.271	-1.341	-1.416
0.018	-1.551	-1.638	-1.705	-1.759	-1.462	-1.516	-1.552	-1.612	-1.681
0.025	-1.731	-1.816	-1.880	-1.937	-1.651	-1.696	-1.730	-1.791	-1.856
0.035	-1.816	-1.901	-1.966	-2.023	-1.733	-1.780	-1.816	-1.876	-1.941
0.050	-1.802	-1.897	-1.967	-2.029	-1.720	-1.772	-1.811	-1.877	-1.948
0.075	-1.762	-1.859	-1.932	-1.996	-1.684	-1.734	-1.775	-1.842	-1.917
0.100	-1.733	-1.828	-1.901	-1.965	-1.657	-1.708	-1.747	-1.815	-1.888
0.150	-1.682	-1.779	-1.853	-1.918	-1.612	-1.663	-1.703	-1.771	-1.844
0.200	-1.628	-1.727	-1.811	-1.876	-1.564	-1.613	-1.655	-1.725	-1.806
0.250	-1.607	-1.709	-1.784	-1.850	-1.545	-1.599	-1.639	-1.705	-1.782
0.320	-1.576	-1.683	-1.765	-1.830	-1.515	-1.573	-1.617	-1.664	-1.764
0.380	-1.573	-1.684	-1.762	-1.825	-1.519	-1.575	-1.624	-1.670	-1.762
0.440	-0.927	-1.653	-1.735	-1.812	-1.499	-1.555	-1.577	-1.269	-1.754
0.500	-0.675	-0.988	-1.127	-1.736	-0.943	-1.551	-1.500	-1.042	-1.735
0.560	-0.434	-0.849	-0.982	-1.046	-0.681	-0.919	-0.936	-0.969	-1.136
0.620	-0.392	-0.889	-0.965	-0.925	-0.558	-0.822	-0.918	-0.937	-0.991
0.680	-0.395	-0.840	-0.771	-0.750	-0.410	-0.648	-0.839	-0.888	-0.904
0.740	-0.384	-0.423	-0.557	-0.508	-0.351	-0.467	-0.644	-0.711	-0.709
0.800	-0.357	-0.318	-0.404	-0.424	-0.322	-0.352	-0.509	-0.659	-0.544
0.850	-0.332	-0.293	-0.311	-0.348	-0.297	-0.298	-0.363	-0.552	-0.425
0.900	-0.283	-0.260	-0.268	-0.313	-0.255	-0.243	-0.268	-0.432	-0.337
0.950	-0.186	-0.167	-0.197	-0.263	-0.176	-0.165	-0.189	-0.325	-0.270
0.980	-0.120	-0.122	-0.156	-0.206	-0.111	-0.114	-0.147	-0.298	-0.228
1.000	-0.061	-0.103	-0.145	-0.190	-0.068	-0.094	-0.135	-0.247	-0.219
Lower surface									
0.000	1.026	0.980	0.939	0.899	1.044	1.022	1.005	0.969	0.926
0.002	1.021	1.067	1.094	1.111	1.009	1.036	1.055	1.083	1.107
0.006	0.720	0.814	0.878	0.926	0.694	0.747	0.786	0.848	0.910
0.011	0.538	0.641	0.712	0.770	0.514	0.568	0.611	0.679	0.750
0.017	0.419	0.522	0.596	0.652	0.396	0.450	0.492	0.561	0.632
0.027	0.305	0.403	0.472	0.529	0.282	0.335	0.375	0.441	0.509
0.050	0.213	0.297	0.356	0.404	0.196	0.240	0.273	0.328	0.387
0.100	0.104	0.173	0.220	0.257	0.089	0.125	0.153	0.196	0.241
0.150	0.029	0.089	0.129	0.160	0.017	0.048	0.070	0.106	0.147
0.200	-0.009	0.043	0.077	0.100	-0.019	0.000	0.024	0.053	0.089
0.250	-0.035	-0.040	-0.014	0.001	-0.046	-0.024	-0.009	-0.009	-0.010
0.300	-0.156	-0.118	-0.099	-0.090	-0.168	-0.150	-0.139	-0.127	-0.106
0.440	-0.197	-0.166	-0.156	-0.157	-0.208	-0.195	-0.188	-0.186	-0.173
0.520	-0.143	-0.122	-0.121	-0.140	-0.141	-0.143	-0.143	-0.147	-0.144
0.600	0.027	0.039	0.034	0.021	0.043	0.027	0.025	0.013	0.012
0.680	0.160	0.166	0.159	0.145	0.158	0.159	0.155	0.140	0.138
0.740	0.236	0.242	0.233	0.219	0.217	0.236	0.231	0.214	0.210
0.800	0.286	0.288	0.278	0.262	0.265	0.285	0.278	0.258	0.255
0.850	0.310	0.312	0.301	0.284	0.310	0.310	0.302	0.276	0.278
0.900	0.289	0.288	0.274	0.254	0.289	0.287	0.275	0.243	0.247
0.950	0.229	0.224	0.205	0.179	0.229	0.225	0.205	0.160	0.170
0.980	0.098	0.087	0.058	0.027	0.096	0.090	0.064	-0.009	0.010
1.000	-0.061	-0.103	-0.145	-0.190	-0.068	-0.094	-0.135	-0.247	-0.219

	M = 0.725									
α	0.68	0.93	1.18	1.43	1.68	2.18	2.68	3.18	3.68	4.18
C_L	0.296	0.337	0.381	0.422	0.457	0.572	0.672	0.783	0.927	1.062
C_M	-0.099	-0.098	-0.098	-0.098	-0.099	-0.097	-0.095	-0.097	-0.111	-0.134
C_D	0.011	0.011	0.011	0.011		0.0142		0.0262		

C_p

x/c										
Upper surface										
0.000	1.1379	1.1384	1.1368	1.135	1.132	1.121	1.106	1.088	1.070	1.049
0.002	0.7150	0.6826	0.6471	0.617	0.582	0.510	0.445	0.384	0.333	0.280
0.005	0.3251	0.2834	0.2393	0.197	0.149	0.077	-0.003	-0.063	-0.130	-0.184
0.009	-0.2526	-0.3056	-0.3585	-0.404	-0.456	-0.546	-0.626	-0.699	-0.756	-0.811
0.013	-0.6452	-0.6960	-0.7542	-0.801	-0.849	-0.926	-0.997	-1.057	-1.112	-1.161
0.018	-0.8511	-0.9196	-0.9826	-1.025	-1.074	-1.176	-1.252	-1.330	-1.379	-1.441
0.025	-0.9744	-1.0595	-1.1289	-1.186	-1.251	-1.356	-1.444	-1.512	-1.571	-1.623
0.035	-0.9888	-1.1197	-1.2128	-1.277	-1.342	-1.442	-1.526	-1.597	-1.653	-1.706
0.050	-0.8292	-0.9594	-1.1261	-1.220	-1.292	-1.407	-1.500	-1.570	-1.635	-1.693
0.075	-0.7245	-0.8225	-0.9762	-1.160	-1.246	-1.367	-1.458	-1.535	-1.598	-1.657
0.100	-0.6385	-0.7266	-0.8589	-1.052	-1.201	-1.335	-1.433	-1.508	-1.575	-1.633
0.150	-0.5448	-0.6245	-0.7595	-0.598	-0.534	-1.259	-1.373	-1.454	-1.530	-1.589
0.200	-0.5193	-0.5443	-0.5744	-0.592	-0.575	-1.124	-1.321	-1.416	-1.483	-1.545
0.250	-0.4911	-0.5168	-0.5433	-0.556	-0.572	-0.499	-1.271	-1.371	-1.447	-1.525
0.320	-0.4659	-0.4881	-0.5130	-0.529	-0.549	-0.530	-0.569	-1.358	-1.432	-1.504
0.380	-0.4652	-0.4849	-0.5073	-0.523	-0.544	-0.558	-0.476	-0.849	-1.445	-1.507
0.440	-0.4492	-0.4690	-0.4880	-0.500	-0.521	-0.544	-0.495	-0.520	-1.409	-1.488
0.500	-0.4488	-0.4554	-0.4708	-0.483	-0.501	-0.527	-0.509	-0.433	-0.688	-1.495
0.560	-0.4357	-0.4491	-0.4641	-0.474	-0.490	-0.516	-0.513	-0.451	-0.494	-0.842
0.620	-0.4145	-0.4256	-0.4386	-0.447	-0.459	-0.482	-0.488	-0.450	-0.410	-0.672
0.680	-0.3966	-0.4052	-0.4167	-0.421	-0.432	-0.455	-0.460	-0.442	-0.384	-0.498
0.740	-0.3687	-0.3726	-0.3820	-0.386	-0.395	-0.413	-0.420	-0.413	-0.373	-0.366
0.800	-0.3380	-0.3459	-0.3501	-0.352	-0.358	-0.372	-0.378	-0.377	-0.350	-0.305
0.850	-0.3113	-0.3152	-0.3190	-0.321	-0.325	-0.335	-0.341	-0.342	-0.322	-0.285
0.900	-0.2630	-0.2649	-0.2672	-0.267	-0.270	-0.277	-0.283	-0.284	-0.276	-0.254
0.950	-0.1649	-0.1656	-0.1667	-0.166	-0.168	-0.172	-0.178	-0.186	-0.181	-0.171
0.980	-0.0906	-0.0906	-0.0914	-0.091	-0.092	-0.096	-0.102	-0.107	-0.111	-0.110
1.000	-0.0363	-0.0371	-0.0391	-0.040	-0.041	-0.045	-0.047	-0.050	-0.058	-0.071
Lower surface										
0.000	1.1379	1.1384	1.1368	1.135	1.132	1.121	1.106	1.088	1.070	1.049
0.002	0.5588	0.6100	0.6604	0.706	0.748	0.821	0.884	0.932	0.971	1.008
0.006	-0.0579	0.0551	0.1050	0.175	0.244	0.360	0.469	0.555	0.628	0.692
0.011	-0.2315	-0.1588	-0.0824	-0.042	0.047	0.169	0.277	0.368	0.441	0.508
0.017	-0.3364	-0.2657	-0.1947	-0.127	-0.060	0.056	0.164	0.252	0.325	0.392
0.027	-0.4818	-0.3180	-0.2515	-0.196	-0.134	-0.028	0.068	0.150	0.218	0.281
0.050	-0.3432	-0.2928	-0.2441	-0.198	-0.149	-0.061	0.016	0.087	0.141	0.194
0.100	-0.3276	-0.2926	-0.2561	-0.218	-0.183	-0.118	-0.053	-0.001	0.046	0.089
0.150	-0.3444	-0.3128	-0.2824	-0.251	-0.220	-0.163	-0.108	-0.062	-0.020	0.016
0.200	-0.3568	-0.3304	-0.3048	-0.256	-0.230	-0.180	-0.131	-0.091	-0.053	-0.022
0.250	-0.3703	-0.3482	-0.3258	-0.302	-0.279	-0.243	-0.193	-0.157	-0.126	-0.098
0.300	-0.4143	-0.3933	-0.3740	-0.352	-0.331	-0.295	-0.255	-0.224	-0.196	-0.171
0.440	-0.4145	-0.3981	-0.3852	-0.365	-0.347	-0.317	-0.284	-0.256	-0.232	-0.213
0.520	-0.2919	-0.2857	-0.2756	-0.263	-0.250	-0.229	-0.204	-0.186	-0.168	-0.155
0.600	-0.0718	-0.0646	-0.0582	-0.050	-0.040	-0.025	-0.010	0.002	0.013	0.021
0.680	0.0864	0.0944	0.0978	0.105	0.112	0.121	0.134	0.144	0.152	0.157
0.740	0.1758	0.1810	0.1857	0.191	0.198	0.207	0.216	0.225	0.232	0.236
0.800	0.2436	0.2528	0.2417	0.247	0.251	0.259	0.269	0.276	0.281	0.285
0.850	0.2659	0.2590	0.2620	0.277	0.282	0.289	0.297	0.302	0.308	
0.900	0.2559	0.2594	0.2621	0.266	0.269	0.275	0.282	0.286	0.289	0.290
0.950	0.2054	0.2078	0.2097	0.212	0.215	0.218	0.224	0.226	0.229	0.228
0.980	0.0899	0.0914	0.0926	0.094	0.096	0.096	0.099	0.099	0.100	0.097
1.000	-0.0363	-0.0371	-0.0391	-0.040	-0.041	-0.045	-0.047	-0.050	-0.058	-0.071

Table 4 (continued)

M = 0.725		M = 0.73		M = 0.735
α	4.68	3.68	4.18	4.18
c_L	1.143	0.952	1.080	1.079
c_M	-0.155	-0.120	-0.148	-0.156

c_p

x/c				
Upper surface				
0.000	1.033	1.075	1.058	1.067
0.002	0.244	0.351	0.304	0.326
0.005	-0.222	-0.106	-0.159	-0.130
0.009	-0.851	-0.720	-0.773	-0.739
0.013	-1.195	-1.080	-1.126	-1.091
0.018	-1.474	-1.352	-1.406	-1.367
0.025	-1.656	-1.537	-1.586	-1.547
0.035	-1.740	-1.618	-1.667	-1.628
0.050	-1.731	-1.602	-1.655	-1.616
0.075	-1.695	-1.567	-1.621	-1.583
0.100	-1.670	-1.543	-1.598	-1.561
0.150	-1.626	-1.501	-1.556	-1.521
0.200	-1.580	-1.458	-1.512	-1.479
0.260	-1.566	-1.427	-1.497	-1.465
0.320	-1.542	-1.420	-1.477	-1.447
0.380	-1.545	-1.426	-1.482	-1.453
0.440	-1.526	-1.410	-1.469	-1.442
0.500	-1.534	-1.154	-1.473	-1.447
0.560	-1.060	-0.650	-1.253	-1.373
0.620	-0.854	-0.457	-0.772	-0.814
0.680	-0.717	-0.372	-0.597	-0.668
0.740	-0.542	-0.355	-0.421	-0.499
0.800	-0.409	-0.331	-0.317	-0.371
0.850	-0.301	-0.312	-0.275	-0.287
0.900	-0.243	-0.272	-0.249	-0.243
0.950	-0.166	-0.179	-0.163	-0.159
0.980	-0.116	-0.111	-0.110	-0.109
1.000	-0.104	-0.056	-0.076	-0.084
Lower surface				
0.000	1.033	1.075	1.058	1.067
0.002	1.028	0.968	1.000	0.992
0.006	0.730	0.621	0.677	0.664
0.011	0.552	0.434	0.495	0.480
0.017	0.434	0.318	0.378	0.364
0.027	0.321	0.213	0.269	0.256
0.050	0.227	0.137	0.183	0.173
0.100	0.115	0.043	0.081	0.072
0.150	0.038	-0.024	0.008	0.000
0.200	-0.002	-0.056	-0.028	-0.036
0.280	-0.083	-0.130	-0.107	-0.114
0.360	-0.159	-0.199	-0.180	-0.188
0.440	-0.205	-0.237	-0.222	-0.230
0.520	-0.152	-0.170	-0.161	-0.168
0.600	0.021	0.012	0.017	0.013
0.680	0.154	0.151	0.153	0.151
0.740	0.233	0.231	0.233	0.231
0.800	0.281	0.282	0.282	0.280
0.850	0.306	0.309	0.309	0.306
0.900	0.283	0.290	0.288	0.287
0.950	0.220	0.229	0.226	0.225
0.980	0.082	0.100	0.093	0.091
1.000	-0.104	-0.056	-0.076	-0.084

M = 0.74

α	3.68	4.18	4.68	5.18	6.18	7.18
c_L	0.992	1.064	1.076	1.114	1.151	1.281
c_M	-0.144	-0.161	-0.161	-0.172	-0.180	-0.193

c_p

x/c						
Upper surface						
0.000	1.089	1.075	1.061	1.048	1.016	0.979
0.002	0.390	0.351	0.315	0.281	0.215	0.142
0.005	-0.058	-0.100	-0.137	-0.174	-0.248	-0.327
0.009	-0.663	-0.712	-0.750	-0.780	-0.854	-0.929
0.013	-1.019	-1.058	-1.090	-1.121	-1.191	-1.264
0.018	-1.285	-1.331	-1.366	-1.398	-1.461	-1.527
0.025	-1.469	-1.510	-1.542	-1.573	-1.633	-1.698
0.035	-1.550	-1.591	-1.624	-1.657	-1.718	-1.781
0.050	-1.534	-1.578	-1.614	-1.650	-1.717	-1.788
0.075	-1.502	-1.546	-1.582	-1.619	-1.687	-1.759
0.100	-1.481	-1.526	-1.562	-1.597	-1.664	-1.734
0.150	-1.443	-1.489	-1.525	-1.560	-1.627	-1.699
0.200	-1.404	-1.447	-1.484	-1.519	-1.586	-1.663
0.260	-1.376	-1.420	-1.463	-1.509	-1.576	-1.646
0.320	-1.371	-1.413	-1.453	-1.492	-1.549	-1.632
0.380	-1.382	-1.424	-1.460	-1.493	-1.509	-1.624
0.440	-1.365	-1.408	-1.444	-1.459	-1.172	-1.626
0.500	-1.381	-1.424	-1.405	-1.134	-1.011	-1.518
0.560	-1.287	-1.346	-0.902	-0.963	-0.910	-1.564
0.620	-0.690		-0.788	-0.828	-0.861	-0.970
0.680	-0.533	-0.704	-0.731	-0.811	-0.846	-0.869
0.740	-0.400	-0.572	-0.641	-0.705	-0.781	-0.784
0.800	-0.320	-0.463	-0.528	-0.642	-0.737	-0.626
0.850	-0.280	-0.359	-0.440	-0.542	-0.672	-0.572
0.900	-0.247	-0.254	-0.340	-0.414	-0.562	-0.466
0.950	-0.162	-0.177	-0.256	-0.335	-0.481	-0.472
0.980	-0.104	-0.128	-0.227	-0.287	-0.444	-0.398
1.000	-0.066	-0.121	-0.193	-0.232	-0.366	-0.396
Lower surface						
0.000	1.089	1.075	1.061	1.048	1.016	0.979
0.002	0.956	0.988	1.006	1.026	1.061	1.093
0.006	0.597	0.647	0.686	0.727	0.797	0.869
0.011	0.410	0.463	0.504	0.547	0.622	0.700
0.017	0.296	0.347	0.387	0.430	0.505	0.575
0.027	0.192	0.239	0.277	0.317	0.389	0.456
0.050	0.120	0.160	0.191	0.224	0.283	0.344
0.100	0.029	0.060	0.083	0.110	0.157	0.210
0.150	-0.036	-0.010	0.007	0.029	0.069	0.108
0.200	-0.069	-0.047	-0.031	-0.014	0.018	0.048
0.280	-0.142	-0.125	-0.115	-0.101	-0.078	-0.052
0.360	-0.213	-0.201	-0.195	-0.187	-0.172	-0.145
0.440	-0.251	-0.243	-0.244	-0.240	-0.235	-0.223
0.520	-0.181	-0.181	-0.185	-0.189	-0.193	-0.200
0.600	0.007	0.004	-0.004	-0.008	-0.019	-0.025
0.680	0.148	0.143	0.133	0.127	0.115	0.103
0.740	0.229	0.224	0.212	0.206	0.190	0.178
0.800	0.280	0.273	0.260	0.252	0.234	0.231
0.850	0.307	0.299	0.282	0.272	0.253	0.246
0.900	0.289	0.276	0.264	0.242	0.213	0.202
0.950	0.228	0.211	0.177	0.162	0.121	0.106
0.980	0.098	0.070	0.019	-0.010	-0.068	-0.082
1.000	-0.066	-0.121	-0.193	-0.232	-0.366	-0.396

Table 4 (continued)

M = 0.73

α	-0.82	0.18	0.68	0.93	1.18	1.43	1.68	2.18	3.18	3.68
C_L	0.035	0.2101	0.307	0.356	0.395	0.434	0.492	0.622	0.898	0.974
C_M	-0.099	-0.101	-0.103	-0.102	-0.103	-0.103	-0.102	-0.102	-0.138	-0.154
C_D	0.0114	0.0115	0.0114	0.0117	0.0120	0.0121	0.0136	0.0167	0.025	

C_p

x/c										
Upper surface										
0.000	1.119	1.144	1.148	1.148	1.148	1.147	1.144	1.136	1.114	1.103
0.002	0.934	0.816	0.748	0.715	0.684	0.661	0.630	0.560	0.464	0.432
0.005	0.636	0.462	0.371	0.330	0.291	0.259	0.216	0.143	0.037	-0.009
0.009	0.176	-0.067	-0.187	-0.238	-0.285	-0.317	-0.363	-0.455	-0.570	-0.609
0.013	-0.144	-0.433	-0.568	-0.623	-0.671	-0.702	-0.745	-0.829	-0.929	-0.958
0.018	-0.307	-0.629	-0.783	-0.839	-0.893	-0.920	-0.965	-1.066	-1.179	-1.212
0.025	-0.382	-0.725	-0.915	-0.983	-1.040	-1.079	-1.135	-1.239	-1.357	-1.399
0.035	-0.403	-0.736	-0.986	-1.066	-1.131	-1.174	-1.229	-1.325	-1.440	-1.479
0.050	-0.369	-0.642	-0.916	-1.017	-1.085	-1.133	-1.192	-1.299	-1.419	-1.464
0.075	-0.353	-0.605	-0.774	-0.968	-1.053	-1.101	-1.162	-1.267	-1.390	-1.433
0.100	-0.324	-0.484	-0.699	-0.890	-1.017	-1.067	-1.135	-1.250	-1.370	-1.415
0.150	-0.341	-0.492	-0.544	-0.583	-0.598	-0.957	-1.048	-1.185	-1.326	-1.380
0.200	-0.340	-0.471	-0.537	-0.574	-0.556	-0.495	-1.001	-1.161	-1.304	-1.345
0.260	-0.339	-0.452	-0.517	-0.543	-0.561	-0.543	-0.480	-1.138	-1.272	-1.315
0.320	-0.341	-0.439	-0.492	-0.519	-0.542	-0.545	-0.507	-1.123	-1.268	-1.310
0.380	-0.356	-0.445	-0.493	-0.517	-0.540	-0.551	-0.552	-0.556	-1.288	-1.329
0.440	-0.357	-0.435	-0.478	-0.500	-0.520	-0.532	-0.544	-0.440	-1.280	-1.318
0.500	-0.359	-0.428	-0.466	-0.485	-0.503	-0.514	-0.530	-0.464	-1.286	-1.339
0.560	-0.367	-0.429	-0.464	-0.480	-0.496	-0.505	-0.522	-0.494	-1.212	-1.261
0.620	-0.357	-0.410	-0.439	-0.452	-0.465	-0.474	-0.487	-0.483	-0.629	-0.877
0.680	-0.349	-0.394	-0.418	-0.429	-0.440	-0.446	-0.457	-0.463	-0.486	-0.638
0.740	-0.328	-0.364	-0.384	-0.392	-0.400	-0.406	-0.415	-0.424	-0.381	-0.509
0.800	-0.309	-0.337	-0.353	-0.358	-0.364	-0.368	-0.375	-0.383	-0.325	-0.410
0.850	-0.290	-0.311	-0.323	-0.327	-0.330	-0.333	-0.338	-0.346	-0.289	-0.318
0.900	-0.248	-0.262	-0.269	-0.271	-0.272	-0.274	-0.277	-0.284	-0.244	-0.262
0.950	-0.155	-0.162	-0.165	-0.165	-0.167	-0.168	-0.170	-0.177	-0.162	-0.161
0.980	-0.081	-0.085	-0.088	-0.089	-0.089	-0.090	-0.092	-0.099	-0.099	-0.110
1.000	-0.025	-0.032	-0.034	-0.037	-0.038	-0.039	-0.041	-0.046	-0.061	-0.094
Lower surface										
0.000	1.119	1.144	1.148	1.148	1.148	1.147	1.144	1.136	1.114	1.103
0.002	0.249	0.454	0.562	0.608	0.659	0.701	0.742	0.820	0.910	0.940
0.006	-0.524	-0.205	-0.057	0.035	0.105	0.162	0.228	0.355	0.510	0.568
0.011	-0.729	-0.406	-0.234	-0.160	-0.088	-0.035	0.031	0.163	0.325	0.378
0.017	-0.907	-0.527	-0.347	-0.271	-0.199	-0.143	-0.077	0.050	0.210	0.265
0.027	-0.967	-0.564	-0.396	-0.327	-0.261	-0.212	-0.151	-0.033	0.113	0.165
0.050	-0.839	-0.486	-0.357	-0.303	-0.250	-0.212	-0.162	-0.064	0.056	0.097
0.100	-0.671	-0.432	-0.343	-0.304	-0.265	-0.232	-0.195	-0.122	-0.025	0.010
0.150	-0.585	-0.439	-0.361	-0.327	-0.293	-0.267	-0.234	-0.167	-0.083	-0.055
0.200	-0.547	-0.422	-0.355	-0.325	-0.296	-0.271	-0.242	-0.186	-0.111	-0.086
0.280	-0.560	-0.450	-0.395	-0.368	-0.341	-0.320	-0.296	-0.246	-0.181	-0.161
0.360	-0.593	-0.493	-0.441	-0.419	-0.396	-0.376	-0.352	-0.308	-0.250	-0.233
0.440	-0.556	-0.483	-0.442	-0.424	-0.405	-0.389	-0.370	-0.333	-0.285	-0.273
0.520	-0.372	-0.332	-0.307	-0.296	-0.284	-0.274	-0.261	-0.237	-0.205	-0.199
0.600	-0.115	-0.088	-0.072	-0.064	-0.056	-0.049	-0.041	-0.026	-0.006	-0.004
0.680	0.053	0.076	0.090	0.095	0.101	0.108	0.114	0.126	0.139	0.140
0.740	0.145	0.166	0.179	0.184	0.190	0.195	0.201	0.211	0.223	0.222
0.800	0.204	0.224	0.237	0.241	0.246	0.250	0.257	0.265	0.275	0.273
0.850	0.241	0.258	0.269	0.273	0.278	0.282	0.287	0.295	0.303	0.300
0.900	0.239	0.252	0.262	0.264	0.268	0.270	0.275	0.281	0.286	0.280
0.950	0.194	0.205	0.211	0.213	0.215	0.217	0.220	0.225	0.226	0.217
0.980	0.087	0.091	0.095	0.095	0.096	0.098	0.100	0.100	0.098	0.081
1.000	-0.025	-0.032	-0.034	-0.037	-0.038	-0.039	-0.041	-0.046	-0.061	-0.094

M = 0.76

α	1.18	1.43	1.68	2.68	3.18	3.68	4.18	4.68	5.18	6.18
C_L	0.397	0.449	0.508	0.796	0.896	0.946	0.957	0.947	1.046	1.108
C_M	-0.105	-0.104	-0.104	-0.130	-0.152	-0.161	-0.156	-0.153	-0.173	-0.180
C_D	0.0121	0.0125	0.0139							

C_p

x/c										
Upper surface										
0.000	1.152	1.152	1.149	1.134	1.126	1.116	1.108	1.097	1.084	1.056
0.002	0.705	0.677	0.650	0.546	0.506	0.473	0.444	0.411	0.375	0.309
0.005	0.320	0.282	0.242	0.123	0.083	0.041	0.014	-0.022	-0.064	-0.136
0.009	-0.246	-0.285	-0.327	-0.461	-0.506	-0.548	-0.578	-0.617	-0.652	-0.726
0.013	-0.627	-0.665	-0.705	-0.822	-0.862	-0.894	-0.923	-0.957	-0.988	-1.055
0.018	-0.848	-0.880	-0.923	-1.057	-1.101	-1.143	-1.171	-1.217	-1.254	-1.322
0.025	-0.991	-1.039	-1.090	-1.240	-1.289	-1.327	-1.357	-1.395	-1.430	-1.491
0.035	-1.082	-1.134	-1.184	-1.324	-1.371	-1.407	-1.437	-1.475	-1.510	-1.574
0.050	-1.041	-1.098	-1.151	-1.306	-1.353	-1.392	-1.424	-1.465	-1.503	-1.572
0.075	-1.015	-1.071	-1.125	-1.275	-1.324	-1.364	-1.397	-1.438	-1.477	-1.546
0.100	-0.983	-1.043	-1.103	-1.263	-1.309	-1.347	-1.382	-1.422	-1.460	-1.528
0.150	-0.870	-0.956	-1.030	-1.221	-1.273	-1.315	-1.350	-1.392	-1.430	-1.497
0.200	-0.491	-0.907	-0.996	-1.190	-1.243	-1.285	-1.317	-1.358	-1.396	-1.463
0.260	-0.555	-0.474	-0.981	-1.167	-1.216	-1.258	-1.292	-1.336	-1.389	-1.458
0.320	-0.548	-0.524	-1.455	-1.167	-1.218	-1.256	-1.290	-1.350	-1.377	-1.445
0.380	-0.551	-0.556	-0.499	-1.191	-1.240	-1.277	-1.309	-1.347	-1.386	-1.450
0.440	-0.532	-0.544	-0.525	-1.184	-1.232	-1.268	-1.300	-1.314	-1.379	-1.442
0.500	-0.516	-0.528	-0.533	-1.119	-1.232	-1.285	-1.309	-1.006	-1.387	-1.420
0.560	-0.509	-0.520	-0.533	-1.096	-1.180	-1.215	-0.904	-0.734	-1.374	-1.322
0.620	-0.476	-0.487	-0.498	-0.521	-1.086	-1.122	-0.654	-0.673	-0.803	-0.799
0.680	-0.449	-0.456	-0.467	-0.412	-0.609	-0.645	-0.618	-0.641	-0.694	-0.743
0.740	-0.408	-0.415	-0.423	-0.361	-0.467	-0.550	-0.577	-0.617	-0.654	-0.709
0.800	-0.370	-0.375	-0.381	-0.331	-0.364	-0.438	-0.548	-0.564	-0.551	-0.621
0.850	-0.334	-0.337	-0.343	-0.304	-0.296	-0.354	-0.470	-0.512	-0.495	-0.579
0.900	-0.274	-0.276	-0.280	-0.256	-0.233	-0.274	-0.405	-0.463	-0.430	-0.523
0.950	-0.166	-0.168	-0.171	-0.164	-0.153	-0.204	-0.330	-0.402	-0.440	-0.500
0.980	-0.088	-0.090	-0.092	-0.095	-0.099	-0.154	-0.306	-0.377	-0.332	-0.439
1.000	-0.038	-0.040	-0.041	-0.052	-0.078	-0.142	-0.243	-0.303	-0.356	-0.421
Lower surface										
0.000	1.152	1.152	1.149	1.134	1.126	1.116	1.108	1.097	1.084	1.056
0.002	0.649	0.699	0.758	0.857	0.896	0.923	0.946	0.971	0.999	1.040
0.006	0.089	0.158	0.221	0.417	0.481	0.535	0.574	0.623	0.668	0.746
0.011	-0.105	-0.059	0.024	0.228	0.293	0.347	0.387	0.437	0.484	0.567
0.017	-0.217	-0.149	-0.085	0.114	0.178	0.233	0.272	0.321	0.368	0.451
0.027	-0.280	-0.218	-0.158	0.024	0.084	0.133	0.169	0.216	0.260	0.337
0.050	-0.266	-0.217	-0.169	-0.017	0.032	0.072	0.101	0.139	0.175	0.240
0.100	-0.278	-0.237	-0.201	-0.081	-0.043	-0.010	0.009	0.038	0.068	0.119
0.150	-0.306	-0.272	-0.241	-0.135	-0.102	-0.075	-0.059	-0.035	-0.010	0.031
0.200	-0.309	-0.278	-0.249	-0.156	-0.128	-0.106	-0.094	-0.076	-0.054	-0.018
0.280	-0.356	-0.329	-0.304	-0.222	-0.200	-0.182	-0.177	-0.162	-0.146	-0.119
0.360	-0.413	-0.387	-0.364	-0.289	-0.271	-0.259	-0.259	-0.250	-0.238	-0.218
0.440	-0.422	-0.401	-0.382	-0.320	-0.306	-0.301	-0.308	-0.306	-0.300	-0.291
0.520	-0.292	-0.278	-0.266	-0.227	-0.219	-0.222	-0.235	-0.240	-0.239	-0.242
0.600	-0.058	-0.050	-0.042	-0.016	-0.014	-0.018	-0.034	-0.040	-0.042	-0.050
0.680	0.101	0.108	0.115	0.134	0.134	0.128	0.112	0.104	0.101	0.089
0.740	0.190	0.196	0.202	0.219	0.218	0.211	0.195	0.185	0.183	0.169
0.800	0.247	0.253	0.258	0.273	0.271	0.262	0.245	0.233	0.229	0.216
0.850	0.279	0.284	0.289	0.302	0.298	0.289	0.268	0.255	0.253	0.237
0.900	0.269	0.273	0.277	0.287	0.282	0.265	0.239	0.224	0.220	0.198
0.950	0.217	0.219	0.222	0.229	0.220	0.198	0.158	0.137	0.133	0.104
0.980	0.098	0.100	0.102	0.103	0.087	0.050	-0.009	-0.044	-0.052	-0.093
1.000	-0.038	-0.040	-0.041	-0.052	-0.078	-0.142	-0.243	-0.303	-0.356	-0.421

Table 4 (continued)

M = 0.77

α	0.93	1.18	1.43	1.68	2.68	3.18	3.68
C_L	0.363	0.413	0.463	0.527	0.803	0.867	0.897
C_M	-0.106	-0.107	-0.107	-0.107	-0.147	-0.159	-0.160
C_D	0.0119	0.0116	0.0132	0.0147			

C_p

x/c							
Upper surface							
0.000	1.157	1.155	1.156	1.154	1.143	1.136	1.128
0.002	0.747	0.719	0.696	0.669	0.579	0.546	0.514
0.005	0.374	0.339	0.307	0.269	0.165	0.132	0.091
0.009	-0.176	-0.219	-0.251	-0.291	-0.408	-0.448	-0.490
0.013	-0.551	-0.595	-0.626	-0.664	-0.766	-0.802	-0.834
0.018	-0.768	-0.818	-0.839	-0.880	-0.995	-1.035	-1.077
0.025	-0.906	-0.955	-0.995	-1.043	-1.175	-1.219	-1.258
0.035	-0.992	-1.048	-1.090	-1.137	-1.259	-1.301	-1.340
0.050	-0.956	-1.012	-1.058	-1.107	-1.242	-1.284	-1.325
0.075	-0.929	-0.992	-1.036	-1.085	-1.213	-1.259	-1.298
0.100	-0.897	-0.969	-1.013	-1.067	-1.206	-1.247	-1.283
0.150	-0.809	-0.886	-0.940	-1.003	-1.159	-1.212	-1.255
0.200	-0.501	-0.853	-0.910	-0.979	-1.139	-1.183	-1.228
0.260	-0.556	-0.463	-0.901	-0.977	-1.121	-1.162	-1.204
0.320	-0.545	-0.522	-0.438	-0.971	-1.123	-1.166	-1.205
0.380	-0.549	-0.564	-0.522	-0.636	-1.148	-1.191	-1.228
0.440	-0.533	-0.559	-0.543	-0.438	-1.145	-1.185	-1.221
0.500	-0.517	-0.538	-0.542	-0.482	-1.080	-1.177	-1.236
0.560	-0.512	-0.531	-0.538	-0.518	-1.098	-1.139	-1.172
0.620	-0.479	-0.490	-0.502	-0.499	-1.032	-1.081	-1.123
0.680	-0.450	-0.460	-0.468	-0.472	-0.636	-0.853	-0.649
0.740	-0.409	-0.418	-0.424	-0.430	-0.427	-0.511	-0.519
0.800	-0.371	-0.377	-0.381	-0.386	-0.341	-0.400	-0.439
0.850	-0.335	-0.339	-0.342	-0.346	-0.287	-0.320	-0.374
0.900	-0.274	-0.276	-0.279	-0.282	-0.231	-0.247	-0.306
0.950	-0.165	-0.167	-0.168	-0.172	-0.149	-0.176	-0.265
0.980	-0.086	-0.088	-0.089	-0.092	-0.092	-0.130	-0.211
1.000	-0.036	-0.038	-0.039	-0.041	-0.067	-0.120	-0.202
Lower surface							
0.000	1.157	1.155	1.156	1.154	1.143	1.136	1.128
0.002	0.606	0.649	0.696	0.734	0.843	0.898	0.906
0.006	0.026	0.093	0.151	0.212	0.390	0.446	0.501
0.011	-0.171	-0.102	-0.047	0.015	0.198	0.259	0.312
0.017	-0.286	-0.214	-0.157	-0.094	0.087	0.145	0.198
0.027	-0.345	-0.280	-0.226	-0.167	0.000	0.053	0.102
0.050	-0.319	-0.266	-0.224	-0.176	-0.037	0.005	0.045
0.100	-0.321	-0.280	-0.244	-0.208	-0.097	-0.064	-0.034
0.150	-0.345	-0.309	-0.280	-0.247	-0.151	-0.123	-0.098
0.200	-0.345	-0.314	-0.286	-0.257	-0.173	-0.149	-0.129
0.280	-0.390	-0.362	-0.339	-0.314	-0.240	-0.223	-0.207
0.360	-0.450	-0.424	-0.400	-0.376	-0.309	-0.297	-0.289
0.440	-0.454	-0.434	-0.415	-0.395	-0.341	-0.335	-0.335
0.520	-0.307	-0.295	-0.284	-0.272	-0.240	-0.241	-0.248
0.600	-0.065	-0.057	-0.050	-0.041	-0.024	-0.027	-0.036
0.680	0.097	0.104	0.110	0.116	0.129	0.124	0.113
0.740	0.185	0.191	0.198	0.203	0.214	0.208	0.198
0.800	0.243	0.248	0.254	0.260	0.268	0.261	0.249
0.850	0.276	0.281	0.286	0.291	0.298	0.289	0.273
0.900	0.268	0.271	0.275	0.279	0.283	0.269	0.250
0.950	0.217	0.219	0.221	0.225	0.223	0.203	0.176
0.980	0.098	0.100	0.102	0.103	0.094	0.061	0.016
1.000	-0.036	-0.038	-0.039	-0.041	-0.067	-0.120	-0.202

M = 0.775

α	-0.82	0.18	0.68	0.93	1.18	1.43	2.18	1.68	2.68	3.68
C_L	0.026	0.209	0.308	0.358	0.411	0.471	0.694	0.538	0.802	0.873
C_M	-0.101	-0.106	-0.108	-0.108	-0.108	-0.109	-0.131	-0.110	-0.155	-0.159
C_D	0.0119	0.0118	0.0110	0.0120	0.012	0.0138	0.0169			

C_p

x/c										
Upper surface										
0.000	1.132	1.154	1.158	1.158	1.159	1.158	1.154	1.157	1.148	1.134
0.002	0.947	0.844	0.784	0.758	0.732	0.707	0.632	0.680	0.597	0.534
0.005	0.652	0.501	0.423	0.389	0.356	0.321	0.239	0.284	0.186	0.115
0.009	0.198	-0.012	-0.114	-0.157	-0.196	-0.233	-0.333	-0.272	-0.381	-0.460
0.013	-0.121	-0.370	-0.484	-0.529	-0.570	-0.605	-0.699	-0.642	-0.739	-0.804
0.018	-0.288	-0.569	-0.701	-0.750	-0.790	-0.818	-0.927	-0.858	-0.964	-1.045
0.025	-0.370	-0.675	-0.828	-0.882	-0.928	-0.972	-1.086	-1.018	-1.142	-1.223
0.035	-0.396	-0.729	-0.907	-0.967	-1.020	-1.066	-1.176	-1.114	-1.227	-1.305
0.050	-0.366	-0.635	-0.873	-0.933	-0.987	-1.036	-1.152	-1.085	-1.210	-1.291
0.075	-0.357	-0.635	-0.829	-0.909	-0.968	-1.016	-1.129	-1.064	-1.183	-1.266
0.100	-0.327	-0.479	-0.770	-0.878	-0.949	-0.995	-1.120	-1.048	-1.177	-1.252
0.150	-0.349	-0.511	-0.506	-0.801	-0.871	-0.929	-1.065	-0.987	-1.126	-1.224
0.200	-0.352	-0.492	-0.573	-0.510	-0.844	-0.904	-1.050	-0.968	-1.112	-1.199
0.260	-0.353	-0.481	-0.544	-0.547	-0.589	-0.903	-1.048	-0.969	-1.097	-1.177
0.320	-0.356	-0.465	-0.524	-0.549	-0.488	-0.724	-1.048	-0.970	-1.100	-1.179
0.380	-0.374	-0.472	-0.530	-0.557	-0.561	-0.473	-1.048	-0.869	-1.125	-1.203
0.440	-0.375	-0.464	-0.517	-0.542	-0.564	-0.512	-1.059	-0.625	-1.123	-1.197
0.500	-0.378	-0.458	-0.504	-0.525	-0.547	-0.541	-0.988	-0.438	-1.056	-1.211
0.560	-0.389	-0.461	-0.501	-0.520	-0.540	-0.546	-1.010	-0.475	-1.079	-1.150
0.620	-0.377	-0.438	-0.471	-0.484	-0.500	-0.509	-0.726	-0.480	-1.019	-1.108
0.680	-0.368	-0.418	-0.444	-0.455	-0.467	-0.473	-0.425	-0.466	-0.946	-0.663
0.740	-0.344	-0.384	-0.404	-0.412	-0.422	-0.428	-0.363	-0.429	-0.478	-0.513
0.800	-0.322	-0.352	-0.367	-0.373	-0.380	-0.385	-0.334	-0.386	-0.362	-0.438
0.850	-0.300	-0.323	-0.332	-0.336	-0.340	-0.345	-0.305	-0.347	-0.292	-0.384
0.900	-0.253	-0.266	-0.272	-0.274	-0.277	-0.280	-0.253	-0.281	-0.227	-0.321
0.950	-0.152	-0.159	-0.163	-0.164	-0.166	-0.169	-0.158	-0.170	-0.148	-0.292
0.980	-0.075	-0.081	-0.084	-0.085	-0.087	-0.089	-0.089	-0.091	-0.098	-0.236
1.000	-0.020	-0.028	-0.033	-0.035	-0.038	-0.039	-0.050	-0.040	-0.082	-0.230
Lower surface										
0.000	1.132	1.154	1.158	1.158	1.159	1.158	1.154	1.157	1.148	1.134
0.002	0.290	0.464	0.559	0.601	0.642	0.695	0.789	0.731	0.834	0.897
0.006	-0.462	-0.195	-0.046	0.018	0.082	0.147	0.300	0.208	0.375	0.484
0.011	-0.666	-0.400	-0.247	-0.180	-0.114	-0.051	0.109	0.010	0.182	0.294
0.017	-0.840	-0.536	-0.367	-0.296	-0.228	-0.161	-0.002	-0.099	0.071	0.181
0.027	-0.910	-0.588	-0.424	-0.356	-0.292	-0.230	-0.082	-0.173	-0.014	0.086
0.050	-0.886	-0.510	-0.382	-0.328	-0.277	-0.227	-0.104	-0.180	-0.050	0.031
0.100	-0.801	-0.459	-0.368	-0.328	-0.290	-0.248	-0.155	-0.212	-0.109	-0.046
0.150	-0.582	-0.422	-0.390	-0.354	-0.320	-0.284	-0.200	-0.252	-0.162	-0.110
0.200	-0.563	-0.454	-0.385	-0.352	-0.322	-0.290	-0.215	-0.262	-0.183	-0.140
0.280	-0.615	-0.490	-0.434	-0.407	-0.382	-0.344	-0.278	-0.319	-0.251	-0.220
0.360	-0.675	-0.549	-0.488	-0.461	-0.436	-0.408	-0.348	-0.383	-0.323	-0.304
0.440	-0.587	-0.528	-0.486	-0.465	-0.445	-0.422	-0.374	-0.403	-0.357	-0.353
0.520	-0.369	-0.341	-0.321	-0.310	-0.299	-0.286	-0.258	-0.275	-0.251	-0.262
0.600	-0.111	-0.087	-0.072	-0.065	-0.058	-0.050	-0.032	-0.042	-0.029	-0.045
0.680	0.051	0.077	0.090	0.097	0.102	0.110	0.124	0.116	0.125	0.107
0.740	0.140	0.167	0.180	0.186	0.192	0.198	0.211	0.205	0.211	0.192
0.800	0.200	0.226	0.238	0.244	0.248	0.255	0.266	0.260	0.265	0.243
0.850	0.238	0.261	0.272	0.277	0.281	0.287	0.295	0.292	0.294	0.269
0.900	0.240	0.257	0.265	0.269	0.273	0.277	0.283	0.280	0.278	0.253
0.950	0.197	0.209	0.215	0.217	0.219	0.223	0.227	0.226	0.217	0.197
0.980	0.090	0.096	0.098	0.099	0.100	0.103	0.101	0.104	0.086	0.001
1.000	-0.020	-0.028	-0.033	-0.035	-0.038	-0.039	-0.050	-0.040	-0.082	-0.230

Table 4 (continued)

M = 0.78

α	1.18	1.43	1.68	2.68	3.18	3.68	4.18	4.68	5.18	6.18
C_L	0.437	0.478	0.556	0.78	0.827	0.848	0.863	0.879	0.941	1.039
C_M	-0.110	-0.110	-0.115	-0.157	-0.161	-0.159	-0.155	-0.156	-0.168	-0.186
C_D	0.0130	0.0142	0.0126							

C_p

x/c										
Upper surface										
0.000	1.161	1.161	1.160	1.152	1.145	1.139	1.133	1.122	1.112	1.090
0.002	0.733	0.715	0.691	0.614	0.582	0.554	0.519	0.491	0.458	0.390
0.005	0.357	0.333	0.298	0.208	0.175	0.139	0.106	0.070	0.033	-0.039
0.009	-0.190	-0.216	-0.252	-0.355	-0.393	-0.431	-0.468	-0.503	-0.536	-0.612
0.013	-0.562	-0.585	-0.620	-0.711	-0.747	-0.775	-0.812	-0.839	-0.868	-0.934
0.018	-0.785	-0.797	-0.835	-0.934	-0.972	-1.011	-1.046	-1.087	-1.123	-1.195
0.025	-0.920	-0.950	-0.993	-1.110	-1.154	-1.189	-1.229	-1.263	-1.297	-1.362
0.035	-1.013	-1.045	-1.088	-1.196	-1.236	-1.271	-1.309	-1.343	-1.376	-1.442
0.050	-0.981	-1.016	-1.060	-1.179	-1.222	-1.258	-1.296	-1.333	-1.369	-1.440
0.075	-0.965	-0.998	-1.041	-1.153	-1.198	-1.233	-1.274	-1.311	-1.346	-1.416
0.100	-0.950	-0.979	-1.027	-1.149	-1.190	-1.221	-1.262	-1.298	-1.334	-1.404
0.150	-0.880	-0.918	-0.970	-1.096	-1.152	-1.194	-1.235	-1.273	-1.310	-1.378
0.200	-0.850	-0.897	-0.952	-1.084	-1.131	-1.168	-1.208	-1.246	-1.283	-1.350
0.260	-0.865	-0.895	-0.959	-1.074	-1.113	-1.147	-1.187	-1.227	-1.268	-1.346
0.320	-0.611	-0.903	-0.961	-1.078	-1.119	-1.155	-1.192	-1.228	-1.269	-1.339
0.380	-0.492	-0.587	-0.871	-1.102	-1.145	-1.179	-1.214	-1.248	-1.284	-1.348
0.440	-0.536	-0.450	-0.890	-1.102	-1.142	-1.175	-1.209	-1.242	-1.276	-1.342
0.500	-0.561	-0.508	-0.731	-1.035	-1.122	-1.185	-1.227	-1.244	-1.287	-1.352
0.560	-0.558	-0.544	-0.446	-1.060	-1.100	-1.131	-1.156	-0.800	-1.137	-1.366
0.620	-0.511	-0.514	-0.441	-1.002	-1.044	-1.089	-0.668	-0.631	-0.699	-0.903
0.680	-0.476	-0.478	-0.441	-1.029	-1.012	-0.691	-0.581	-0.603	-0.663	-0.743
0.740	-0.428	-0.432	-0.416	-0.532	-0.517	-0.510	-0.540	-0.596	-0.633	-0.699
0.800	-0.385	-0.388	-0.380	-0.381	-0.410	-0.437	-0.503	-0.559	-0.599	-0.641
0.850	-0.344	-0.347	-0.342	-0.300	-0.340	-0.388	-0.465	-0.527	-0.561	-0.605
0.900	-0.278	-0.281	-0.278	-0.250	-0.277	-0.343	-0.434	-0.516	-0.536	-0.575
0.950	-0.166	-0.168	-0.168	-0.157	-0.226	-0.311	-0.374	-0.464	-0.487	-0.606
0.980	-0.087	-0.088	-0.089	-0.112	-0.181	-0.265	-0.361	-0.452	-0.478	-0.526
1.000	-0.038	-0.039	-0.040	-0.102	-0.174	-0.255	-0.308	-0.376	-0.405	-0.547
Lower surface										
0.000	1.161	1.161	1.160	1.152	1.145	1.139	1.133	1.122	1.112	1.090
0.002	0.652	0.693	0.728	0.825	0.858	0.887	0.919	0.942	0.970	1.019
0.006	0.097	0.144	0.202	0.359	0.412	0.465	0.517	0.565	0.612	0.700
0.011	-0.098	-0.054	0.005	0.165	0.222	0.276	0.329	0.376	0.426	0.517
0.017	-0.212	-0.165	-0.106	0.054	0.110	0.165	0.216	0.265	0.313	0.403
0.027	-0.279	-0.235	-0.178	-0.029	0.020	0.068	0.118	0.161	0.208	0.293
0.050	-0.266	-0.231	-0.185	-0.065	-0.022	0.017	0.057	0.094	0.131	0.203
0.100	-0.282	-0.251	-0.216	-0.121	-0.090	-0.059	-0.028	-0.001	0.029	0.087
0.150	-0.314	-0.288	-0.257	-0.173	-0.149	-0.122	-0.096	-0.074	-0.049	0.001
0.200	-0.319	-0.294	-0.266	-0.194	-0.174	-0.153	-0.130	-0.112	-0.093	-0.050
0.280	-0.321	-0.299	-0.324	-0.265	-0.251	-0.234	-0.217	-0.205	-0.189	-0.154
0.360	-0.437	-0.417	-0.392	-0.339	-0.332	-0.322	-0.310	-0.303	-0.292	-0.264
0.440	-0.449	-0.432	-0.411	-0.374	-0.374	-0.374	-0.368	-0.371	-0.366	-0.349
0.520	-0.299	-0.289	-0.277	-0.262	-0.269	-0.276	-0.278	-0.285	-0.291	-0.288
0.600	-0.056	-0.050	-0.042	-0.056	-0.045	-0.053	-0.058	-0.069	-0.073	-0.078
0.680	0.105	0.111	0.117	0.120	0.109	0.100	0.094	0.082	0.077	0.070
0.740	0.193	0.199	0.205	0.206	0.196	0.185	0.179	0.166	0.162	0.153
0.800	0.251	0.256	0.261	0.260	0.249	0.237	0.230	0.217	0.211	0.203
0.850	0.283	0.289	0.293	0.289	0.277	0.264	0.254	0.239	0.233	0.223
0.900	0.275	0.278	0.281	0.272	0.255	0.237	0.223	0.208	0.199	0.187
0.950	0.221	0.224	0.226	0.210	0.183	0.159	0.138	0.116	0.105	0.088
0.980	0.102	0.103	0.105	0.074	0.031	-0.008	-0.038	-0.074	-0.088	-0.116
1.000	-0.038	-0.039	-0.040	-0.102	-0.174	-0.255	-0.308	-0.376	-0.405	-0.547

M = 0.785

α	0.93	1.18	1.43	1.68	2.68	3.68
C_L	0.374	0.448	0.483	0.572	0.765	0.830
C_M	-0.110	-0.111	-0.112	-0.121	-0.158	-0.159
C_D	0.0123	0.0132	0.0125			

C_p

x/c						
Upper surface						
0.000	1.163	1.161	1.162	1.162	1.155	1.145
0.002	0.770	0.741	0.725	0.702	0.631	0.570
0.005	0.405	0.369	0.346	0.314	0.230	0.159
0.009	-0.131	-0.174	-0.198	-0.233	-0.327	-0.406
0.013	-0.499	-0.543	-0.566	-0.598	-0.684	-0.750
0.018	-0.718	-0.762	-0.776	-0.814	-0.903	-0.984
0.025	-0.850	-0.899	-0.928	-0.968	-1.078	-1.160
0.035	-0.936	-0.992	-1.023	-1.063	-1.163	-1.242
0.050	-0.906	-0.961	-0.995	-1.037	-1.147	-1.230
0.075	-0.888	-0.947	-0.979	-1.020	-1.123	-1.205
0.100	-0.868	-0.934	-0.961	-1.006	-1.120	-1.196
0.150	-0.787	-0.869	-0.903	-0.952	-1.065	-1.167
0.200	-0.782	-0.845	-0.887	-0.937	-1.057	-1.144
0.260	-0.562	-0.862	-0.888	-0.944	-1.050	-1.126
0.320	-0.495	-0.857	-0.902	-0.950	-1.053	-1.134
0.380	-0.568	-0.578	-0.803	-0.868	-1.078	-1.159
0.440	-0.584	-0.475	-0.538	-0.893	-1.080	-1.156
0.500	-0.555	-0.534	-0.456	-0.861	-1.012	-1.164
0.560	-0.534	-0.573	-0.507	-0.824	-1.040	-1.113
0.620	-0.504	-0.518	-0.506	-0.461	-0.984	-1.073
0.680	-0.469	-0.480	-0.479	-0.404	-1.018	-0.757
0.740	-0.423	-0.431	-0.434	-0.387	-0.586	-0.509
0.800	-0.381	-0.387	-0.390	-0.362	-0.393	-0.440
0.850	-0.341	-0.345	-0.348	-0.329	-0.308	-0.392
0.900	-0.276	-0.278	-0.281	-0.268	-0.238	-0.354
0.950	-0.163	-0.165	-0.167	-0.163	-0.171	-0.327
0.980	-0.084	-0.086	-0.088	-0.087	-0.132	-0.285
1.000	-0.035	-0.037	-0.040	-0.041	-0.124	-0.276
Lower surface						
0.000	1.163	1.161	1.162	1.162	1.155	1.145
0.002	0.605	0.651	0.688	0.724	0.815	0.879
0.006	0.023	0.095	0.139	0.195	0.343	0.451
0.011	-0.177	-0.101	-0.069	-0.002	0.149	0.261
0.017	-0.294	-0.216	-0.171	-0.116	0.038	0.149
0.027	-0.358	-0.283	-0.241	-0.186	-0.045	0.056
0.050	-0.329	-0.269	-0.236	-0.192	-0.076	0.006
0.100	-0.333	-0.286	-0.256	-0.221	-0.131	-0.069
0.150	-0.361	-0.317	-0.294	-0.262	-0.185	-0.112
0.200	-0.361	-0.323	-0.300	-0.272	-0.208	-0.163
0.280	-0.411	-0.376	-0.356	-0.331	-0.277	-0.246
0.360	-0.480	-0.446	-0.425	-0.401	-0.355	-0.337
0.440	-0.484	-0.458	-0.441	-0.421	-0.393	-0.393
0.520	-0.314	-0.301	-0.292	-0.282	-0.273	-0.288
0.600	-0.064	-0.056	-0.050	-0.042	-0.044	-0.060
0.680	0.098	0.105	0.111	0.116	0.114	0.094
0.740	0.186	0.193	0.199	0.204	0.201	0.180
0.800	0.244	0.251	0.256	0.260	0.255	0.233
0.850	0.278	0.283	0.289	0.292	0.283	0.259
0.900	0.271	0.275	0.278	0.282	0.266	0.232
0.950	0.220	0.223	0.225	0.227	0.202	0.151
0.980	0.102	0.103	0.104	0.104	0.061	-0.017
1.000	-0.035	-0.037	-0.040	-0.041	-0.124	-0.276

Table 4 (continued)

M = 0.79

α	0.68	0.93	1.18	1.43	1.68	2.18	2.68	3.18	3.68
C_L	0.329	0.382	0.442	0.498	0.583	0.685	0.743	0.780	0.812
C_M	-0.111	-0.112	-0.113	-0.116	-0.130	-0.151	-0.158	-0.160	-0.162
C_D	0.0121	0.0125	0.0124	0.0129	0.0148				

C_p

x/c									
Upper surface									
0.000	1.164	1.165	1.165	1.165	1.164	1.163	1.159	1.154	1.149
0.002	0.803	0.778	0.755	0.736	0.714	0.680	0.647	0.617	0.589
0.005	0.448	0.416	0.387	0.360	0.330	0.295	0.249	0.219	0.183
0.009	-0.075	-0.114	-0.150	-0.180	-0.211	-0.254	-0.301	-0.338	-0.375
0.013	-0.438	-0.480	-0.517	-0.544	-0.575	-0.616	-0.656	-0.692	-0.721
0.018	-0.651	-0.697	-0.733	-0.753	-0.785	-0.831	-0.874	-0.911	-0.948
0.025	-0.780	-0.828	-0.870	-0.904	-0.940	-0.994	-1.045	-1.089	-1.126
0.035	-0.861	-0.915	-0.962	-0.998	-1.036	-1.085	-1.132	-1.172	-1.208
0.050	-0.835	-0.887	-0.932	-0.972	-1.010	-1.061	-1.115	-1.159	-1.196
0.075	-0.807	-0.871	-0.919	-0.957	-0.995	-1.042	-1.093	-1.137	-1.173
0.100	-0.770	-0.848	-0.907	-0.941	-0.981	-1.033	-1.091	-1.133	-1.169
0.150	-0.733	-0.784	-0.846	-0.887	-0.930	-0.982	-1.038	-1.088	-1.121
0.200	-0.688	-0.780	-0.826	-0.874	-0.916	-0.976	-1.030	-1.076	-1.114
0.260	-0.516	-0.777	-0.848	-0.879	-0.926	-0.976	-1.026	-1.065	-1.099
0.320	-0.557	-0.460	-0.846	-0.894	-0.935	-0.983	-1.032	-1.072	-1.108
0.380	-0.572	-0.524	-0.735	-0.809	-0.897	-0.968	-1.034	-1.099	-1.134
0.440	-0.554	-0.573	-0.516	-0.800	-0.883	-0.994	-1.058	-1.098	-1.131
0.500	-0.545	-0.607	-0.497	-0.702	-0.860	-0.938	-0.990	-1.063	-1.135
0.560	-0.541	-0.606	-0.554	-0.483	-0.838	-0.957	-1.020	-1.060	-1.091
0.620	-0.498	-0.501	-0.525	-0.459	-0.867	-0.922	-0.967	-1.007	-1.047
0.680	-0.463	-0.472	-0.483	-0.457	-0.499	-0.961	-1.002	-1.032	-0.913
0.740	-0.418	-0.426	-0.434	-0.425	-0.364	-0.601	-0.642	-0.531	-0.513
0.800	-0.377	-0.383	-0.389	-0.386	-0.333	-0.360	-0.401	-0.415	-0.443
0.850	-0.339	-0.342	-0.346	-0.345	-0.306	-0.281	-0.317	-0.353	-0.400
0.900	-0.273	-0.276	-0.278	-0.278	-0.252	-0.217	-0.249	-0.302	-0.368
0.950	-0.160	-0.162	-0.163	-0.165	-0.154	-0.137	-0.189	-0.268	-0.343
0.980	-0.081	-0.083	-0.085	-0.086	-0.084	-0.089	-0.155	-0.225	-0.305
1.000	-0.033	-0.035	-0.037	-0.039	-0.044	-0.074	-0.147	-0.218	-0.295
Lower surface									
0.000	1.164	1.165	1.165	1.165	1.164	1.163	1.159	1.154	1.149
0.002	0.564	0.604	0.641	0.679	0.718	0.765	0.806	0.842	0.869
0.006	-0.041	0.020	0.080	0.134	0.185	0.238	0.325	0.381	0.432
0.011	-0.244	-0.178	-0.117	-0.065	-0.013	0.064	0.132	0.191	0.241
0.017	-0.368	-0.298	-0.234	-0.177	-0.124	-0.048	0.021	0.077	0.130
0.027	-0.429	-0.362	-0.300	-0.247	-0.196	-0.125	-0.060	-0.009	0.038
0.050	-0.389	-0.334	-0.284	-0.241	-0.200	-0.142	-0.089	-0.048	-0.007
0.100	-0.379	-0.337	-0.301	-0.261	-0.229	-0.183	-0.144	-0.112	-0.082
0.150	-0.403	-0.365	-0.330	-0.299	-0.270	-0.230	-0.196	-0.171	-0.145
0.200	-0.398	-0.365	-0.335	-0.306	-0.280	-0.252	-0.217	-0.196	-0.176
0.280	-0.447	-0.417	-0.390	-0.364	-0.341	-0.311	-0.290	-0.276	-0.260
0.360	-0.524	-0.492	-0.464	-0.436	-0.414	-0.388	-0.374	-0.366	-0.355
0.440	-0.518	-0.495	-0.474	-0.453	-0.435	-0.418	-0.415	-0.415	-0.416
0.520	-0.324	-0.314	-0.305	-0.295	-0.287	-0.281	-0.289	-0.295	-0.303
0.600	-0.070	-0.063	-0.057	-0.050	-0.045	-0.043	-0.050	-0.060	-0.068
0.680	0.092	0.099	0.104	0.111	0.116	0.116	0.107	0.098	0.088
0.740	0.181	0.187	0.193	0.200	0.203	0.204	0.195	0.185	0.176
0.800	0.240	0.245	0.251	0.257	0.260	0.260	0.250	0.239	0.228
0.850	0.274	0.279	0.284	0.289	0.292	0.290	0.279	0.266	0.254
0.900	0.268	0.272	0.276	0.279	0.282	0.276	0.260	0.243	0.227
0.950	0.218	0.221	0.223	0.226	0.227	0.217	0.194	0.168	0.146
0.980	0.101	0.102	0.104	0.105	0.104	0.086	0.047	0.007	-0.027
1.000	-0.033	-0.035	-0.037	-0.039	-0.044	-0.074	-0.147	-0.218	-0.295

M = 0.795

α	-0.82	0.18	0.68	0.93	1.18	1.43	1.68	2.68	3.68
C_L	0.014	0.208	0.328	0.396	0.451	0.510	0.591	0.723	0.797
C_M	-0.103	-0.108	-0.113	-0.115	-0.117	-0.123	-0.140	-0.159	-0.164
C_D	0.0138	0.0124		0.012	0.0124	0.0136			

C_p

x/c									
Upper surface									
0.000	1.143	1.162	1.166	1.167	1.168	1.167	1.167	1.163	1.154
0.002	0.952	0.864	0.812	0.786	0.769	0.745	0.727	0.664	0.605
0.005	0.660	0.531	0.463	0.429	0.400	0.374	0.346	0.289	0.203
0.009	0.211	0.030	-0.058	-0.101	-0.131	-0.161	-0.190	-0.227	-0.250
0.013	-0.108	-0.321	-0.419	-0.464	-0.494	-0.524	-0.551	-0.651	-0.696
0.018	-0.280	-0.520	-0.625	-0.677	-0.700	-0.731	-0.761	-0.847	-0.920
0.025	-0.368	-0.629	-0.758	-0.810	-0.849	-0.881	-0.913	-1.015	-1.097
0.035	-0.400	-0.705	-0.840	-0.898	-0.938	-0.975	-1.009	-1.104	-1.179
0.050	-0.369	-0.630	-0.816	-0.871	-0.913	-0.950	-0.983	-1.086	-1.168
0.075	-0.368	-0.614	-0.789	-0.857	-0.900	-0.936	-0.969	-1.066	-1.146
0.100	-0.337	-0.623	-0.753	-0.833	-0.877	-0.921	-0.956	-1.065	-1.143
0.150	-0.364	-0.519	-0.726	-0.780	-0.833	-0.871	-0.908	-1.014	-1.096
0.200	-0.370	-0.531	-0.701	-0.779	-0.816	-0.859	-0.895	-1.007	-1.090
0.260	-0.372	-0.499	-0.497	-0.782	-0.835	-0.867	-0.907	-1.005	-1.077
0.320	-0.376	-0.485	-0.536	-0.675	-0.843	-0.884	-0.917	-1.012	-1.086
0.380	-0.396	-0.504	-0.572	-0.632	-0.752	-0.806	-0.844	-1.033	-1.112
0.440	-0.400	-0.501	-0.590	-0.522	-0.646	-0.807	-0.871	-1.039	-1.111
0.500	-0.407	-0.498	-0.606	-0.553	-0.668	-0.737	-0.852	-0.973	-1.113
0.560	-0.419	-0.507	-0.586	-0.609	-0.631	-0.742	-0.832	-1.003	-1.073
0.620	-0.406	-0.478	-0.199	-0.620	-0.463	-0.653	-0.865	-0.952	-1.029
0.680	-0.392	-0.430	-0.467	-0.460	-0.462	-0.407	-0.888	-0.985	-1.022
0.740	-0.363	-0.408	-0.423	-0.426	-0.427	-0.391	-0.434	-0.710	-0.525
0.800	-0.336	-0.368	-0.380	-0.385	-0.385	-0.366	-0.321	-0.408	-0.448
0.850	-0.310	-0.328	-0.340	-0.343	-0.343	-0.333	-0.281	-0.326	-0.406
0.900	-0.256	-0.269	-0.273	-0.276	-0.274	-0.270	-0.231	-0.262	-0.380
0.950	-0.148	-0.156	-0.160	-0.161	-0.159	-0.160	-0.142	-0.209	-0.358
0.980	-0.068	-0.076	-0.079	-0.083	-0.081	-0.084	-0.080	-0.179	-0.322
1.000	-0.015	-0.025	-0.033	-0.035	-0.036	-0.041	-0.049	-0.171	-0.312
Lower surface									
0.000	1.143	1.162	1.166	1.167	1.168	1.167	1.167	1.163	1.154
0.002	0.331	0.477	0.563	0.604	0.641	0.674	0.710	0.795	0.862
0.006	-0.400	-0.179	-0.047	0.020	0.076	0.128	0.173	0.309	0.419
0.011	-0.602	-0.386	-0.250	-0.180	-0.123	-0.072	-0.023	0.116	0.227
0.017	-0.773	-0.531	-0.376	-0.301	-0.240	-0.185	-0.135	0.004	0.116
0.027	-0.845	-0.597	-0.440	-0.365	-0.306	-0.255	-0.206	-0.077	0.025
0.050	-0.840	-0.523	-0.398	-0.338	-0.292	-0.248	-0.209	-0.103	-0.019
0.100	-0.792	-0.469	-0.388	-0.342	-0.302	-0.267	-0.237	-0.156	-0.092
0.150	-0.765	-0.506	-0.414	-0.371	-0.337	-0.306	-0.278	-0.209	-0.155
0.200	-0.760	-0.482	-0.408	-0.371	-0.346	-0.312	-0.288	-0.230	-0.186
0.280	-0.599	-0.529	-0.464	-0.422	-0.396	-0.372	-0.349	-0.305	-0.272
0.360	-0.644	-0.610	-0.542	-0.507	-0.476	-0.449	-0.428	-0.394	-0.371
0.440	-0.811	-0.709	-0.523	-0.511	-0.492	-0.466	-0.450	-0.440	-0.439
0.520	-0.332	-0.334	-0.326	-0.317	-0.307	-0.298	-0.292	-0.300	-0.315
0.600	-0.103	-0.082	-0.071	-0.064	-0.057	-0.051	-0.045	-0.057	-0.074
0.680	0.047	0.080	0.092	0.099	0.105	0.111	0.115	0.100	0.084
0.740	0.134	0.166	0.181	0.186	0.193	0.199	0.203	0.189	0.171
0.800	0.197	0.225	0.239	0.245	0.251	0.256	0.259	0.244	0.225
0.850	0.238	0.262	0.274	0.280	0.285	0.289	0.292	0.273	0.250
0.900	0.241	0.259	0.269	0.272	0.277	0.280	0.280	0.254	0.223
0.950	0.199	0.215	0.218	0.221	0.224	0.226	0.226	0.183	0.141
0.980	0.094	0.100	0.101	0.101	0.102	0.105	0.102	0.035	-0.034
1.000	-0.015	-0.025	-0.033	-0.035	-0.036	-0.041	-0.049	-0.171	-0.312

Table 4 (continued)

M = 0.8

α	0.93	1.18	1.43	1.68	2.18	2.68	3.18	3.68	4.18	4.68
c_L	0.403	0.460	0.521	0.589	0.662	0.705	0.736	0.776	0.820	0.866
c_M	-0.117	-0.122	-0.131	-0.147	-0.158	-0.160	-0.160	-0.165	-0.168	-0.177
c_D	0.0124	0.0132	0.0153							

c_p

x/c										
Upper surface										
0.000	1.169	1.170	1.170	1.168	1.169	1.166	1.162	1.158	1.152	1.144
0.002	0.793	0.779	0.756	0.738	0.707	0.677	0.650	0.622	0.587	0.558
0.005	0.439	0.418	0.389	0.362	0.334	0.289	0.261	0.224	0.190	0.154
0.009	-0.085	-0.114	-0.141	-0.169	-0.210	-0.253	-0.286	-0.324	-0.364	-0.404
0.013	-0.446	-0.475	-0.502	-0.529	-0.572	-0.606	-0.638	-0.668	-0.705	-0.735
0.018	-0.661	-0.685	-0.706	-0.737	-0.787	-0.820	-0.852	-0.890	-0.928	-0.974
0.025	-0.791	-0.824	-0.856	-0.887	-0.933	-0.985	-1.025	-1.065	-1.105	-1.147
0.035	-0.878	-0.915	-0.949	-0.982	-1.028	-1.074	-1.110	-1.146	-1.186	-1.227
0.050	-0.853	-0.888	-0.925	-0.959	-1.004	-1.057	-1.097	-1.136	-1.175	-1.217
0.075	-0.839	-0.878	-0.913	-0.946	-0.989	-1.038	-1.078	-1.116	-1.157	-1.199
0.100	-0.825	-0.868	-0.897	-0.932	-0.987	-1.037	-1.076	-1.114	-1.150	-1.189
0.150	-0.767	-0.814	-0.851	-0.887	-0.941	-0.988	-1.028	-1.068	-1.126	-1.170
0.200	-0.769	-0.800	-0.841	-0.875	-0.930	-0.982	-1.023	-1.063	-1.104	-1.147
0.260	-0.779	-0.826	-0.850	-0.889	-0.943	-0.982	-1.018	-1.053	-1.087	-1.131
0.320	-0.747	-0.832	-0.870	-0.900	-0.945	-0.990	-1.026	-1.062	-1.099	-1.138
0.380	-0.692	-0.754	-0.797	-0.830	-0.921	-1.009	-1.052	-1.088	-1.124	-1.161
0.440	-0.611	-0.693	-0.802	-0.857	-0.955	-1.018	-1.055	-1.088	-1.121	-1.159
0.500	-0.614	-0.684	-0.744	-0.858	-0.909	-0.953	-1.009	-1.086	-1.139	-1.179
0.560	-0.630	-0.725	-0.756	-0.823	-0.925	-0.984	-1.020	-1.052	-1.083	-1.123
0.620	-0.508	-0.749	-0.797	-0.857	-0.892	-0.935	-0.970	-1.008	-1.080	-1.169
0.680	-0.472	-0.432	-0.760	-0.888	-0.935	-0.970	-0.999	-1.033	-0.965	-0.975
0.740	-0.451	-0.385	-0.372	-0.737	-0.909	-0.799	-0.619	-0.552	-0.539	-0.583
0.800	-0.387	-0.362	-0.329	-0.350	-0.415	-0.416	-0.432	-0.458	-0.481	-0.534
0.850	-0.344	-0.328	-0.302	-0.275	-0.300	-0.332	-0.366	-0.413	-0.448	-0.510
0.900	-0.274	-0.269	-0.250	-0.215	-0.226	-0.274	-0.328	-0.392	-0.429	-0.489
0.950	-0.159	-0.155	-0.150	-0.133	-0.160	-0.226	-0.302	-0.373	-0.417	-0.479
0.980	-0.082	-0.080	-0.080	-0.080	-0.126	-0.198	-0.263	-0.337	-0.389	-0.460
1.000	-0.035	-0.037	-0.042	-0.059	-0.117	-0.189	-0.255	-0.330	-0.379	-0.447
Lower surface										
0.000	1.169	1.170	1.170	1.168	1.169	1.166	1.162	1.158	1.152	1.144
0.002	0.604	0.637	0.669	0.696	0.746	0.788	0.825	0.855	0.891	0.918
0.006	0.021	0.071	0.119	0.161	0.235	0.296	0.352	0.406	0.467	0.516
0.011	-0.179	-0.128	-0.080	-0.036	0.040	0.103	0.161	0.214	0.277	0.327
0.017	-0.302	-0.247	-0.194	-0.147	-0.071	-0.010	0.048	0.102	0.164	0.214
0.027	-0.368	-0.314	-0.265	-0.220	-0.148	-0.091	-0.037	0.013	0.071	0.118
0.050	-0.340	-0.295	-0.256	-0.222	-0.159	-0.114	-0.071	-0.029	0.017	0.055
0.100	-0.341	-0.308	-0.275	-0.247	-0.202	-0.169	-0.133	-0.101	-0.062	-0.034
0.150	-0.375	-0.344	-0.316	-0.289	-0.248	-0.220	-0.191	-0.165	-0.130	-0.107
0.200	-0.375	-0.348	-0.320	-0.298	-0.266	-0.240	-0.218	-0.196	-0.165	-0.148
0.280	-0.426	-0.409	-0.381	-0.364	-0.336	-0.317	-0.301	-0.284	-0.258	-0.246
0.360	-0.518	-0.493	-0.465	-0.448	-0.425	-0.411	-0.402	-0.389	-0.369	-0.359
0.440	-0.513	-0.506	-0.484	-0.472	-0.464	-0.463	-0.466	-0.466	-0.448	-0.454
0.520	-0.316	-0.309	-0.302	-0.298	-0.302	-0.310	-0.319	-0.327	-0.323	-0.337
0.600	-0.063	-0.056	-0.052	-0.051	-0.055	-0.063	-0.072	-0.081	-0.080	-0.093
0.680	0.098	0.105	0.110	0.110	0.106	0.096	0.088	0.079	0.078	0.066
0.740	0.187	0.193	0.198	0.198	0.194	0.185	0.176	0.167	0.165	0.153
0.800	0.247	0.251	0.256	0.255	0.249	0.240	0.230	0.221	0.218	0.206
0.850	0.279	0.284	0.289	0.288	0.279	0.268	0.258	0.247	0.244	0.231
0.900	0.274	0.278	0.280	0.278	0.265	0.250	0.236	0.220	0.214	0.199
0.950	0.222	0.225	0.226	0.222	0.201	0.179	0.157	0.138	0.127	0.108
0.980	0.103	0.105	0.104	0.095	0.064	0.025	-0.008	-0.040	-0.058	-0.082
1.000	-0.035	-0.037	-0.042	-0.059	-0.117	-0.189	-0.255	-0.330	-0.379	-0.447

M = 0.8

α	5.18	6.18
c_L	0.913	0.966
c_M	-0.186	-0.192
c_D		

M = 0.805

0.93	1.18	1.43	1.68	2.68	3.68
0.404	0.470	0.521	0.579	0.687	0.759
-0.121	-0.130	-0.137	-0.152	-0.162	-0.166
0.0145	0.0147				

c_p

x/c										
Upper surface										
0.000	1.135	1.118	1.172	1.172	1.171	1.171	1.169	1.163		
0.002	0.526	0.464	0.806	0.785	0.768	0.753	0.692	0.636		
0.005	0.117	0.048	0.452	0.427	0.404	0.383	0.306	0.241		
0.009	-0.430	-0.509	-0.066	-0.094	-0.122	-0.145	-0.230	-0.301		
0.013	-0.764	-0.828	-0.422	-0.453	-0.479	-0.501	-0.580	-0.645		
0.018	-1.010	-1.081	-0.619	-0.657	-0.690	-0.712	-0.794	-0.865		
0.025	-1.180	-1.245	-0.770	-0.804	-0.833	-0.858	-0.956	-1.038		
0.035	-1.258	-1.323	-0.852	-0.891	-0.923	-0.953	-1.046	-1.120		
0.050	-1.251	-1.321	-0.832	-0.869	-0.902	-0.930	-1.029	-1.110		
0.075	-1.232	-1.301	-0.818	-0.858	-0.890	-0.919	-1.011	-1.090		
0.100	-1.223	-1.292	-0.791	-0.836	-0.876	-0.906	-1.009	-1.090		
0.150	-1.204	-1.273	-0.753	-0.799	-0.831	-0.862	-0.961	-1.045		
0.200	-1.181	-1.252	-0.758	-0.786	-0.823	-0.852	-0.957	-1.041		
0.260	-1.169	-1.242	-0.744	-0.808	-0.834	-0.867	-0.958	-1.042		
0.320	-1.170	-1.244	-0.749	-0.825	-0.855	-0.880	-0.968	-1.042		
0.380	-1.192	-1.258	-0.698	-0.750	-0.786	-0.813	-0.985	-1.069		
0.440	-1.188	-1.251	-0.625	-0.718	-0.793	-0.838	-0.997	-1.069		
0.500	-1.209	-1.266	-0.663	-0.690	-0.740	-0.818	-0.934	-1.065		
0.560	-1.161	-1.280	-0.688	-0.735	-0.758	-0.809	-0.965	-1.055		
0.620	-1.240	-1.060	-0.703	-0.773	-0.792	-0.844	-0.918	-0.991		
0.680	-1.031	-0.742	-0.530	-0.807	-0.828	-0.875	-0.953	-1.018		
0.740	-0.624	-0.704	-0.385	-0.415	-0.582	-0.896	-0.899	-0.620		
0.800	-0.577	-0.669	-0.362	-0.319	-0.427	-0.422	-0.431	-0.476		
0.850	-0.552	-0.644	-0.328	-0.291	-0.277	-0.286	-0.339	-0.421		
0.900	-0.535	-0.633	-0.264	-0.240	-0.248	-0.210	-0.285	-0.403		
0.950	-0.525	-0.616	-0.193	-0.196	-0.198	-0.151	-0.241	-0.484		
0.980	-0.509	-0.605	-0.075	-0.077	-0.075	-0.086	-0.215	-0.350		
1.000	-0.496	-0.542	-0.034	-0.034	-0.046	-0.073	-0.209	-0.344		
Lower surface										
0.000	1.135	1.118	1.172	1.172	1.171		1.169	1.163		
0.002	0.947	-2.232	0.801	0.633	0.664	0.689	0.780	0.847		
0.006	0.566	0.666	0.014	0.064	0.111	0.148	0.283	0.395		
0.011	0.378	0.384	-0.187	-0.135	-0.088	-0.049	0.087	0.201		
0.017	0.264	0.369	-0.312	-0.255	-0.204	-0.161	-0.022	0.090		
0.027	0.164	0.261	-0.377	-0.323	-0.274	-0.234	-0.107	0.001		
0.050	0.094	0.178	-0.351	-0.305	-0.260	-0.233	-0.129	-0.059		
0.100	-0.002	0.065	-0.350	-0.315	-0.281	-0.258	-0.175	-0.110		
0.150	-0.080	-0.019	-0.385	-0.351	-0.312	-0.300	-0.230	-0.173		
0.200	-0.125	-0.070	-0.382	-0.354	-0.328	-0.309	-0.253	-0.204		
0.280	-0.228	-0.180	-0.436	-0.413	-0.390	-0.376	-0.330	-0.295		
0.360	-0.345	0.301	-0.530	-0.505	-0.481	-0.467	-0.432	-0.405		
0.440	-0.446	-0.407	-0.611	-0.541	-0.498	-0.497	-0.496	-0.499		
0.520	-0.339	0.324	-0.333	-0.311	-0.305	-0.306	-0.322	-0.348		
0.600	-0.096	-0.091	-0.065	-0.057	-0.054	-0.056	-0.069	-0.089		
0.680	0.062	0.062	0.100	0.104	0.108	0.107	0.090	0.076		
0.740	0.148	0.147	0.189	0.195	0.197	0.194	0.180	0.164		
0.800	0.201	0.200	0.247	0.251	0.254	0.252	0.235	0.218		
0.850	0.225	0.220	0.282	0.285	0.288	0.284	0.264	0.245		
0.900	0.192	0.186	0.275	0.277	0.278	0.274	0.245	0.218		
0.950	0.097	0.088	0.223	0.224	0.224	0.216	0.174	0.134		
0.980	-0.097	-0.112	0.103	0.102	0.102	0.087	0.017	-0.044		
1.000	-0.496	-0.542	0.034	-0.059	-0.046	-0.073	-0.209	-0.344		

Table 4 (continued)

M = 0.81

α	0.680	0.93	1.18	1.43	1.68	2.18	2.68	3.68
C_L	0.352	0.405	0.472	0.516	0.556	0.609	0.664	0.747
C_M	-0.122	-0.126	-0.138		-0.152	-0.156	-0.162	-0.171
C_D	0.0132	0.0127	0.0166	0.019				

C_p

x/c								
Upper surface								
0.000	1.173	1.174	1.168	1.174	1.174	1.173	1.172	1.167
0.002	0.831	0.812	0.793	0.779	0.765	0.736	0.708	0.651
0.005	0.489	0.466	0.443	0.419	0.400	0.366	0.328	0.261
0.009	-0.019	-0.049	-0.078	-0.102	-0.125	-0.161	-0.203	-0.278
0.013	-0.375	-0.406	-0.436	-0.458	-0.480	-0.517	-0.554	-0.620
0.018	-0.578	-0.609	-0.644	-0.664	-0.688	-0.725	-0.770	-0.838
0.025	-0.708	-0.746	-0.779	-0.808	-0.833	-0.876	-0.925	-1.009
0.035	-0.791	-0.832	-0.868	-0.898	-0.926	-0.970	-1.017	-1.091
0.050	-0.771	-0.809	-0.845	-0.876	-0.904	-0.948	-0.998	-1.081
0.075	-0.752	-0.798	-0.836	-0.866	-0.894	-0.937	-0.983	-1.063
0.100	-0.725	-0.782	-0.828	-0.853	-0.882	-0.929	-0.984	-1.064
0.150	-0.711	-0.736	-0.780	-0.810	-0.840	-0.886	-0.938	-1.019
0.200	-0.702	-0.743	-0.768	-0.804	-0.831	-0.880	-0.933	-1.017
0.260	-0.700	-0.758	-0.795	-0.819	-0.849	-0.891	-0.937	-1.010
0.320	-0.620	-0.749	-0.809	-0.838	-0.864	-0.903	-0.946	-1.020
0.380	-0.626	-0.693	-0.742	-0.773	-0.798	-0.859	-0.960	-1.048
0.440	-0.607	-0.625	-0.715	-0.779	-0.821	-0.902	-0.976	-1.049
0.500	-0.626	-0.662	-0.692	-0.730	-0.802	-0.871	-0.915	-1.041
0.560	-0.668	-0.709	-0.732	-0.752	-0.796	-0.880	-0.946	-1.016
0.620	-0.689	-0.735	-0.770	-0.792	-0.832	-0.866	-0.901	-0.973
0.680	-0.683	-0.764	-0.813	-0.824	-0.864	-0.905	-0.937	-1.001
0.740	-0.382	-0.438	-0.786	-0.851	-0.893	-0.931	-0.948	-0.795
0.800	-0.350	-0.323	-0.350	-0.396	-0.500	-0.465	-0.451	-0.513
0.850	-0.321	-0.296	-0.271	-0.276	-0.302	-0.318	-0.348	-0.432
0.900	-0.260	-0.244	-0.218	-0.211	-0.214	-0.248	-0.295	-0.414
0.950	-0.149	-0.143	-0.131	-0.128	-0.139	-0.193	-0.256	-0.397
0.980	-0.073	-0.073	-0.071	-0.074	-0.101	-0.167	-0.234	-0.363
1.000	-0.031	-0.037	-0.045	-0.054	-0.094	-0.159	-0.225	-0.358
Lower surface								
0.000	1.173	1.174	1.168	1.174	1.174	1.173	1.172	1.167
0.002	0.568	0.598	0.625	0.659	0.682	0.729	0.770	0.841
0.006	-0.039	0.009	0.055	0.102	0.136	0.200	0.268	0.382
0.011	-0.243	-0.192	-0.143	-0.098	-0.062	0.005	0.071	0.189
0.017	-0.324	-0.317	-0.264	-0.215	-0.178	-0.109	-0.040	0.078
0.027	-0.443	-0.385	-0.334	-0.285	-0.250	-0.184	-0.119	-0.010
0.050	-0.401	-0.355	-0.312	-0.274	-0.246	-0.193	-0.139	-0.048
0.100	-0.393	-0.357	-0.325	-0.290	-0.270	-0.229	-0.188	-0.118
0.150	-0.428	-0.393	-0.360	-0.332	-0.313	-0.277	-0.242	-0.181
0.200	-0.421	-0.392	-0.365	-0.337	-0.323	-0.295	-0.264	-0.213
0.280	-0.471	-0.458	-0.420	-0.402	-0.390	-0.368	-0.344	-0.305
0.360	-0.568	-0.545	-0.522	-0.497	-0.488	-0.472	-0.451	-0.420
0.440	-0.695	-0.665	-0.632	-0.585	-0.583	-0.574	-0.566	-0.548
0.520	-0.302	-0.306	-0.308	-0.307	-0.313	-0.320	-0.329	-0.346
0.600	-0.066	-0.062	-0.060	-0.055	-0.060	-0.067	-0.075	-0.090
0.680	0.092	0.097	0.101	0.106	0.101	0.095	0.087	0.071
0.740	0.179	0.183	0.189	0.194	0.190	0.183	0.175	0.160
0.800	0.238	0.244	0.246	0.252	0.247	0.239	0.232	0.216
0.850	0.275	0.279	0.281	0.285	0.280	0.270	0.261	0.242
0.900	0.270	0.273	0.274	0.276	0.268	0.254	0.241	0.216
0.950	0.220	0.222	0.221	0.221	0.209	0.187	0.167	0.132
0.980	0.101	0.103	0.100	0.098	0.077	0.039	0.006	-0.047
1.000	-0.031	-0.037	-0.045	-0.054	-0.094	-0.159	-0.225	-0.358

M = 0.82

α	-0.82	0.18	0.68	0.93	1.18	1.43	1.68	2.18	2.68	3.68
C_L	-0.066	0.218	0.361	0.411	0.455	0.491	0.521	0.569	0.627	0.736
C_N	-0.070	-0.114	-0.133	-0.141	-0.147	-0.150	-0.153	-0.156	-0.163	-0.182
C_D	0.0180	0.0161	0.0167	0.0178						

C_p

x/c										
Upper surface										
0.000	1.156	1.173	1.177	1.178	1.179	1.178	1.179	1.179	1.178	1.174
0.002	0.965	0.889	0.848	0.836	0.819	0.803	0.789	0.763	0.734	0.676
0.005	0.679	0.568	0.512	0.492	0.471	0.451	0.432	0.401	0.361	0.294
0.009	0.236	0.083	0.012	-0.011	-0.036	-0.060	-0.083	-0.117	-0.160	-0.237
0.013	-0.081	-0.259	-0.337	-0.361	-0.386	-0.411	-0.434	-0.469	-0.508	-0.577
0.018	-0.253	-0.454	-0.543	-0.553	-0.589	-0.614	-0.637	-0.679	-0.719	-0.792
0.025	-0.346	-0.564	-0.666	-0.701	-0.729	-0.755	-0.781	-0.821	-0.869	-0.958
0.035	-0.383	-0.645	-0.747	-0.781	-0.813	-0.844	-0.872	-0.915	-0.962	-1.042
0.050	-0.355	-0.614	-0.731	-0.765	-0.795	-0.825	-0.852	-0.894	-0.944	-1.033
0.075	-0.368	-0.556	-0.712	-0.752	-0.786	-0.816	-0.844	-0.885	-0.933	-1.015
0.100	-0.332	-0.591	-0.687	-0.726	-0.765	-0.803	-0.832	-0.877	-0.927	-1.018
0.150	-0.366	-0.553	-0.682	-0.698	-0.738	-0.767	-0.794	-0.839	-0.889	-0.976
0.200	-0.377	-0.549	-0.678	-0.712	-0.737	-0.762	-0.789	-0.834	-0.887	-0.976
0.260	-0.382	-0.505	-0.685	-0.722	-0.755	-0.785	-0.807	-0.850	-0.895	-0.972
0.320	-0.389	-0.542	-0.609	-0.719	-0.772	-0.802	-0.827	-0.864	-0.907	-0.983
0.380	-0.417	-0.554	-0.650	-0.677	-0.711	-0.743	-0.764	-0.814	-0.915	-1.011
0.440	-0.429	-0.550	-0.616	-0.623	-0.686	-0.747	-0.784	-0.856	-0.936	-1.014
0.500	-0.438	-0.570	-0.643	-0.659	-0.672	-0.705	-0.757	-0.837	-0.881	-1.002
0.560	-0.468	-0.607	-0.675	-0.704	-0.717	-0.729	-0.762	-0.840	-0.912	-0.985
0.620	-0.432	-0.639	-0.704	-0.741	-0.757	-0.772	-0.799	-0.837	-0.870	-0.943
0.680	-0.410	-0.675	-0.749	-0.773	-0.796	-0.805	-0.828	-0.875	-0.907	-0.971
0.740	-0.370	-0.424	-0.777	-0.803	-0.831	-0.841	-0.858	-0.903	-0.938	-1.003
0.800	-0.331	-0.327	-0.410	-0.547	-0.670	-0.677	-0.648	-0.558	-0.558	-0.741
0.850	-0.293	-0.303	-0.271	-0.284	-0.309	-0.316	-0.322	-0.336	-0.374	-0.477
0.900	-0.224	-0.245	-0.212	-0.201	-0.205	-0.211	-0.225	-0.271	-0.319	-0.426
0.950	-0.106	-0.134	-0.123	-0.116	-0.122	-0.133	-0.156	-0.226	-0.285	-0.413
0.980	-0.023	-0.058	-0.062	-0.063	-0.080	-0.095	-0.125	-0.206	-0.269	-0.388
1.000	0.017	-0.021	-0.036	-0.046	-0.072	-0.088	-0.118	-0.197	-0.259	-0.380
Lower surface										
0.000	1.156	1.173	1.177	1.178	1.179	1.178	1.179	1.179	1.178	1.174
0.002	0.376	0.498	0.564	0.593	0.618	0.646	0.667	0.711	0.756	0.829
0.006	-0.331	-0.148	-0.044	-0.002	0.038	0.080	0.115	0.177	0.244	0.361
0.011	-0.530	-0.354	-0.248	-0.205	-0.161	-0.122	-0.085	-0.018	0.047	0.169
0.017	-0.696	-0.506	-0.383	-0.335	-0.288	-0.241	-0.202	-0.135	-0.065	0.057
0.027	-0.772	-0.581	-0.455	-0.404	-0.357	-0.312	-0.275	-0.210	-0.144	-0.029
0.050	-0.777	-0.518	-0.410	-0.373	-0.336	-0.298	-0.267	-0.215	-0.160	-0.064
0.100	-0.749	-0.559	-0.401	-0.370	-0.343	-0.311	-0.289	-0.249	-0.208	-0.133
0.150	-0.738	-0.525	-0.447	-0.413	-0.384	-0.355	-0.334	-0.299	-0.261	-0.196
0.200	-0.747	-0.510	-0.438	-0.410	-0.387	-0.360	-0.342	-0.319	-0.284	-0.227
0.280	-0.784	-0.557	-0.491	-0.468	-0.447	-0.427	-0.411	-0.389	-0.366	-0.323
0.360	-0.831	-0.641	-0.586	-0.562	-0.547	-0.529	-0.515	-0.498	-0.479	-0.444
0.440	-0.886	-0.774	-0.721	-0.703	-0.690	-0.665	-0.653	-0.641	-0.625	-0.592
0.520	-0.355	-0.360	-0.312	-0.295	-0.295	-0.292	-0.296	-0.309	-0.323	-0.347
0.600	-0.233	-0.100	-0.067	-0.062	-0.060	-0.059	-0.062	-0.072	-0.080	-0.094
0.680	-0.152	0.043	0.082	0.091	0.092	0.096	0.095	0.085	0.078	0.064
0.740	-0.068	0.138	0.170	0.179	0.181	0.184	0.182	0.174	0.165	0.153
0.800	-0.001	0.208	0.232	0.240	0.240	0.242	0.241	0.231	0.223	0.210
0.850	0.112	0.254	0.271	0.276	0.276	0.277	0.275	0.262	0.253	0.237
0.900	0.164	0.254	0.267	0.270	0.268	0.266	0.262	0.244	0.231	0.212
0.950	0.167	0.210	0.217	0.217	0.212	0.207	0.201	0.175	0.156	0.127
0.980	0.096	0.098	0.099	0.095	0.083	0.078	0.062	0.020	-0.008	-0.056
1.000	0.017	-0.021	-0.036	-0.046	-0.072	-0.088	-0.118	-0.197	-0.259	-0.380

Table 4 (concluded)

	M = 0.85	M = 0.84		M = 0.85	M = 0.86	M = 0.87
α	1.18	0.93	1.18	1.18	1.18	4.18
C_L	0.408	0.299	0.331	0.232	0.163	0.602
C_M	-0.143	-0.113	-0.118	-0.079	-0.051	-0.169

C_p

x/c						
Upper surface						
0.000	1.183	1.187	1.188	1.192	1.197	1.199
0.002	0.839	0.871	0.857	0.872	0.884	0.745
0.005	0.500	0.541	0.522	0.544	0.560	0.397
0.009	0.001	0.056	0.035	0.063	0.086	-0.106
0.013	-0.346	-0.283	-0.305	-0.273	-0.246	-0.429
0.018	-0.543	-0.470	-0.502	-0.465	-0.439	-0.634
0.025	-0.681	-0.612	-0.638	-0.600	-0.568	-0.785
0.035	-0.764	-0.689	-0.719	-0.680	-0.647	-0.866
0.050	-0.748	-0.679	-0.705	-0.670	-0.638	-0.858
0.075	-0.739	-0.664	-0.697	-0.660	-0.629	-0.850
0.100	-0.717	-0.639	-0.675	-0.639	-0.611	-0.854
0.150	-0.696	-0.634	-0.658	-0.627	-0.600	-0.824
0.200	-0.702	-0.644	-0.669	-0.640	-0.614	-0.829
0.260	-0.720	-0.659	-0.686	-0.658	-0.633	-0.837
0.320	-0.736	-0.652	-0.703	-0.676	-0.652	-0.851
0.380	-0.683	-0.632	-0.656	-0.632	-0.612	-0.880
0.440	-0.654	-0.592	-0.624	-0.606	-0.595	-0.886
0.500	-0.652	-0.624	-0.632	-0.613	-0.593	-0.900
0.560	-0.698	-0.668	-0.677	-0.657	-0.637	-0.863
0.620	-0.737	-0.704	-0.716	-0.695	-0.676	-0.846
0.680	-0.775	-0.735	-0.753	-0.732	-0.713	-0.859
0.740	-0.810	-0.769	-0.787	-0.767	-0.747	-0.889
0.800	-0.807	-0.770	-0.789	-0.722	-0.723	-0.919
0.850	-0.340	-0.310	-0.324	-0.283	-0.278	-0.957
0.900	-0.217	-0.188	-0.210	-0.190	-0.189	-1.012
0.950	-0.143	-0.116	-0.148	-0.140	-0.148	-0.699
0.980	-0.114	-0.089	-0.126	-0.122	-0.131	-0.553
1.000	-0.110	-0.088	-0.123	-0.109	-0.112	-0.578
Lower surface						
0.000	1.183	1.187	1.188	1.192	1.197	1.199
0.002	0.611	0.584	0.608	0.610	0.614	0.850
0.006	0.024	-0.015	0.018	0.019	0.029	0.389
0.011	-0.176	-0.219	-0.183	-0.180	-0.168	0.206
0.017	-0.306	-0.355	-0.315	-0.314	-0.303	0.092
0.027	-0.478	-0.429	-0.389	-0.389	-0.380	0.006
0.050	-0.652	-0.591	-0.533	-0.358	-0.346	-0.024
0.100	-0.358	-0.465	-0.358	-0.340	-0.385	-0.098
0.150	-0.408	-0.448	-0.422	-0.425	-0.409	-0.165
0.200	-0.408	-0.454	-0.425	-0.439	-0.429	-0.198
0.280	-0.473	-0.494	-0.480	-0.483	-0.482	-0.295
0.360	-0.569	-0.593	-0.581	-0.579	-0.568	-0.418
0.440	-0.717	-0.741	-0.729	-0.729	-0.709	-0.572
0.520	-0.458	-0.485	-0.560	-0.780	-0.876	-0.753
0.600	-0.094	-0.199	-0.193	-0.267	-0.338	-0.365
0.680	0.055	-0.099	-0.083	-0.209	-0.289	-0.218
0.740	0.152	-0.004	0.018	-0.151	-0.259	-0.102
0.800	0.219	0.087	0.114	-0.078	-0.214	-0.069
0.850	0.260	0.162	0.174	0.091	-0.157	0.074
0.900	0.250	0.187	0.198	0.067	-0.088	0.035
0.950	0.193	0.159	0.157	0.087	-0.020	0.046
0.980	0.057	0.047	0.032	0.008	-0.047	-0.083
1.000	-0.110	-0.088	-0.123	-0.109	-0.112	-0.578

	M = 0.875	M = 0.88		M = 0.885			M = 0.89
α	-0.82	2.18	3.18	0.18	0.93	1.18	0.68
C_L	-0.188	0.396	0.394	-0.044	0.068	0.104	0.038
C_M	0.004	-0.110	-0.110	-0.018	-0.037	-0.045	-0.037

C_p

x/c							
Upper surface							
0.000	1.190	1.207	1.207	1.205	1.208	1.211	1.210
0.002	0.986	0.809	0.809	0.949	0.915	0.906	0.930
0.005	0.708	0.473	0.473	0.655	0.610	0.597	0.631
0.009	0.279	-0.013	-0.013	0.210	0.151	0.133	0.178
0.013	-0.087	-0.345	-0.345	-0.106	-0.169	-0.187	-0.137
0.018	-0.290	-0.538	-0.538	-0.287	-0.359	-0.377	-0.328
0.025	-0.397	-0.673	-0.673	-0.393	-0.476	-0.499	-0.438
0.035	-0.349	-0.763	-0.763	-0.474	-0.566	-0.578	-0.518
0.050	-0.311	-0.748	-0.748	-0.461	-0.546	-0.568	-0.510
0.075	-0.463	-0.746	-0.746	-0.421	-0.537	-0.563	-0.495
0.100	-0.335	-0.752	-0.752	-0.441	-0.523	-0.550	-0.477
0.150	-0.343	-0.721	-0.721	-0.454	-0.522	-0.539	-0.494
0.200	-0.371	-0.724	-0.724	-0.452	-0.536	-0.556	-0.504
0.280	-0.386	-0.741	-0.741	-0.464	-0.563	-0.581	-0.526
0.360	-0.393	-0.757	-0.757	-0.455	-0.576	-0.604	-0.521
0.380	-0.413	-0.782	-0.782	-0.477	-0.543	-0.562	-0.517
0.440	-0.429	-0.798	-0.798	-0.485	-0.514	-0.567	-0.490
0.500	-0.455	-0.756	-0.756	-0.508	-0.539	-0.550	-0.522
0.560	-0.497	-0.780	-0.780	-0.543	-0.583	-0.587	-0.563
0.620	-0.537	-0.748	-0.748	-0.575	-0.620	-0.630	-0.596
0.680	-0.581	-0.780	-0.780	-0.613	-0.656	-0.667	-0.632
0.740	-0.615	-0.813	-0.813	-0.650	-0.689	-0.701	-0.665
0.800	-0.652	-0.847	-0.847	-0.685	-0.727	-0.736	-0.702
0.850	-0.699	-0.885	-0.885	-0.730	-0.770	-0.781	-0.747
0.900	-0.499	-0.943	-0.943	-0.795	-0.828	-0.843	-0.810
0.950	-0.411	-0.685	-0.685	-0.361	-0.525	-0.413	-0.717
0.980	-0.169	-0.513	-0.513	-0.288	-0.318	-0.346	-0.417
1.000	-0.157	-0.512	-0.512	-0.283	-0.319	-0.345	-0.394
Lower surface							
0.000	1.190	1.207	1.207	1.205	1.208	1.211	1.210
0.002	0.483	0.775	0.775	0.567	0.620	0.632	0.608
0.006	-0.167	0.283	0.283	-0.041	0.038	0.066	0.021
0.011	-0.359	0.096	0.096	-0.232	-0.154	-0.126	-0.171
0.017	-0.517	-0.017	-0.017	-0.385	-0.292	-0.260	-0.312
0.027	-0.691	-0.097	-0.097	-0.462	-0.369	-0.338	-0.388
0.050	-0.599	-0.111	-0.111	-0.448	-0.328	-0.301	-0.354
0.100	-0.588	-0.165	-0.165	-0.442	-0.391	-0.359	-0.400
0.150	-0.590	-0.225	-0.225	-0.476	-0.399	-0.368	-0.418
0.200	-0.605	-0.249	-0.249	-0.491	-0.400	-0.376	-0.423
0.280	-0.658	-0.316	-0.316	-0.529	-0.450	-0.439	-0.467
0.360	-0.734	-0.446	-0.446	-0.576	-0.541	-0.532	-0.534
0.440	-0.802	-0.595	-0.595	-0.696	-0.671	-0.660	-0.666
0.520	-0.922	-0.765	-0.765	-0.850	-0.826	-0.819	-0.820
0.600	-0.990	-0.852	-0.852	-0.931	-0.910	-0.902	-0.903
0.680	-0.986	-0.486	-0.486	-0.909	-0.888	-0.878	-0.881
0.740	-0.483	-0.271	-0.271	-0.812	-0.589	-0.519	-0.804
0.800	-0.402	-0.204	-0.204	-0.368	-0.216	-0.299	-0.354
0.850	-0.340	-0.134	-0.134	-0.267	-0.236	-0.225	-0.210
0.900	-0.271	-0.049	-0.049	-0.191	-0.161	-0.151	-0.161
0.950	-0.186	-0.005	-0.005	-0.130	-0.101	-0.089	-0.110
0.980	-0.157	-0.115	-0.115	-0.170	-0.153	-0.139	-0.177
1.000	-0.157	-0.512	-0.512	-0.283	-0.319	-0.345	-0.394

SYMBOLS

p	static pressure
H_0	stagnation pressure in the undisturbed free stream
M_L	local Mach number on the surface
M_u	local Mach number just upstream of the shock
M_∞	free stream Mach number
C_L	lift coefficient
C_D	drag coefficient
C_M	pitching moment coefficient about the $\frac{1}{4}$ chord point
C_P	pressure coefficient
α	angle of incidence, degrees
c	aerofoil chord
t	aerofoil thickness
x,y	aerofoil coordinates
Z	aerofoil ordinate measured normal to a datum parallel to the free stream and passing through the trailing edge
V/R	velocity ratio: ratio of local to free stream velocity

REFERENCES

No.	Author	Title, etc.
1	D.J. Hall V.G. Quincey R.C. Lock	Some results of wind tunnel tests on an aerofoil section (NPL9510) combining a 'peaky' upper surface pressure distribution with rear loading. NPL Aero Note 1083 (ARC 31312) (1969)
2	D.J. Hall V.G. Quincey A.G.J. Macdonald	A brief description of some characteristics of aerofoil section NPL9515 a development of NPL9510. NPL Aero Memo 76 (ARC 32019) (1970)
3	D.J. Hall E.M. Love	The design of two supercritical aerofoils derived from the NPL951-series. RAE unpublished material (1971)
4	-	A method for predicting the pressure distribution on swept wings with subsonic attached flow. Royal Aeronautical Society Transonic Data Memorandum 6312 (1963)
5	-	National Physical Laboratory Report for the year 1963, p.24, HMSO
6	J. Osborne	Unpublished RAE data (1972)
7	E.M. Murman	Computation of wall effects in ventilated wind tunnels. AIAA Paper 72-1007 (ARC 33902) (1972)
8	G.S. Smith K.G. Moreton	Experience in the use of pressure transducers and scanning switches for accurate measurement of steady pressures. NPL Aero Note 1073 (1968)
9	-	A method for estimating the pressure distribution on the surface of a two-dimensional aerofoil in a sonic stream. Royal Aeronautical Society Transonic Data Memorandum 69013 (1969)
10	D.J. Peake H. Yoshihara D. Zonars W. Carter	The transonic performance of two-dimensional jet-flapped aerofoils at high Reynolds numbers. AGARD-CP-83-71 (1971)

REFERENCES (concluded)

No.	Author	Title, etc.
11	-	Aviation Week of Space Technology, 22 June 1970, pp.55-60
12	T.G. Ayers	Supercritical aerodynamics worthwhile over a range of speeds. Aeronautics and Astronautics, pp.32-36, August 1972
13	-	Der superkitische Flügel Flug Revue, No.2, pp.40, 42, 44 and 46, February 1972. [Available as 'The supercritical wing', translated by D. Seidl, NASA Technical Translation TT F-14, 242 (1972)]
14	J.L. Hess A.M.O. Smith	Calculation of potential flow about arbitrary bodies. Progress in Aeronautical Sciences, Vol.8, Pergamon Press, London (1966)
15	L.T. Goodmanson	Transonic transports. Proceedings of 12th Anglo-American Aeronautical Conference, Calgary, July 1971
16	F. Bauer P.R. Garabedian D. Korn	Supercritical wing sections. Lecture Notes in Economics and Mathematical Systems, No.66, Springer-Verlag (Berlin) (1972)
17	J.J. Kacprzynski L.H. Ohman P.R. Garabedian D.G. Korn	Analysis of the flow past a shockless lifting airfoil in design and off-design conditions. NRC National Aeronautical Establishment Report LR-554, National Research Council of Canada, Ottawa, Ontario, (1971)

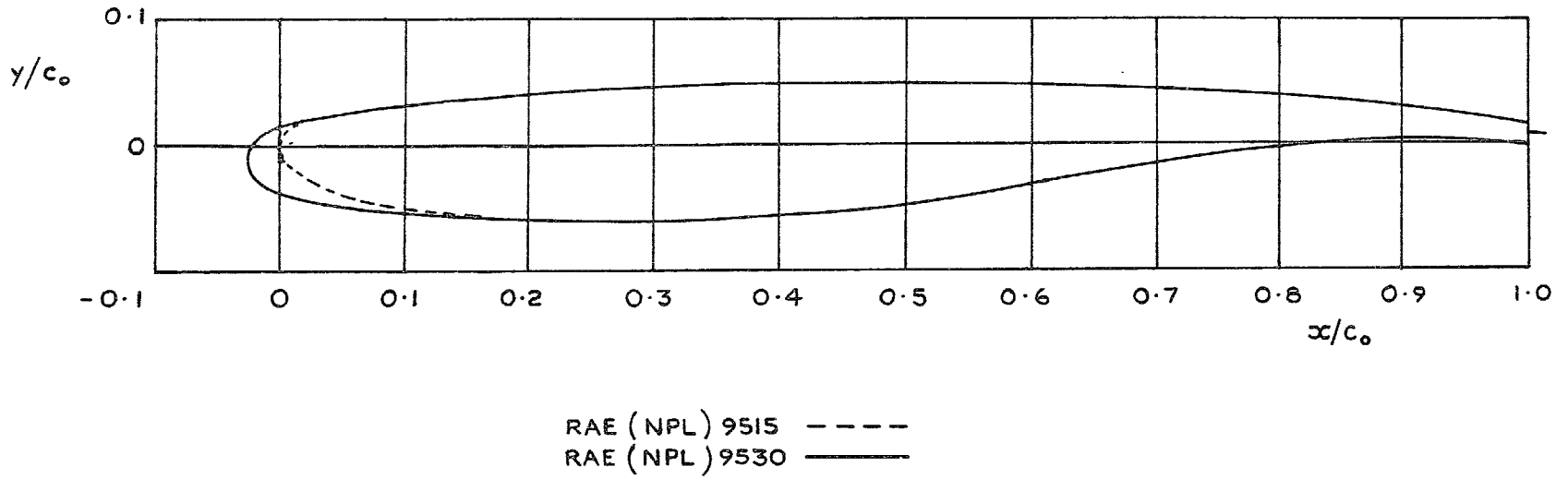
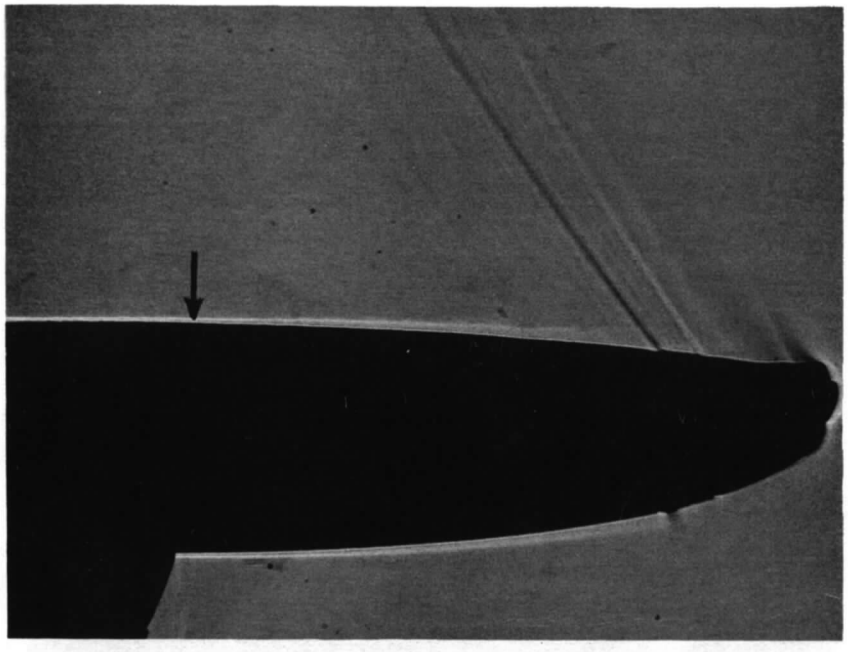
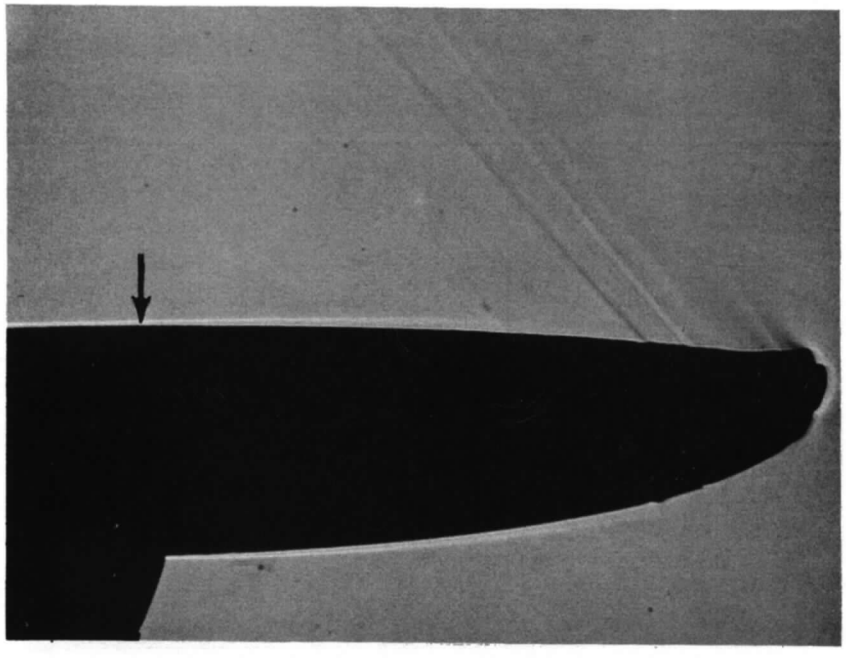


Fig 1 Aerofoil sections RAE (NPL) 9515 and 9530

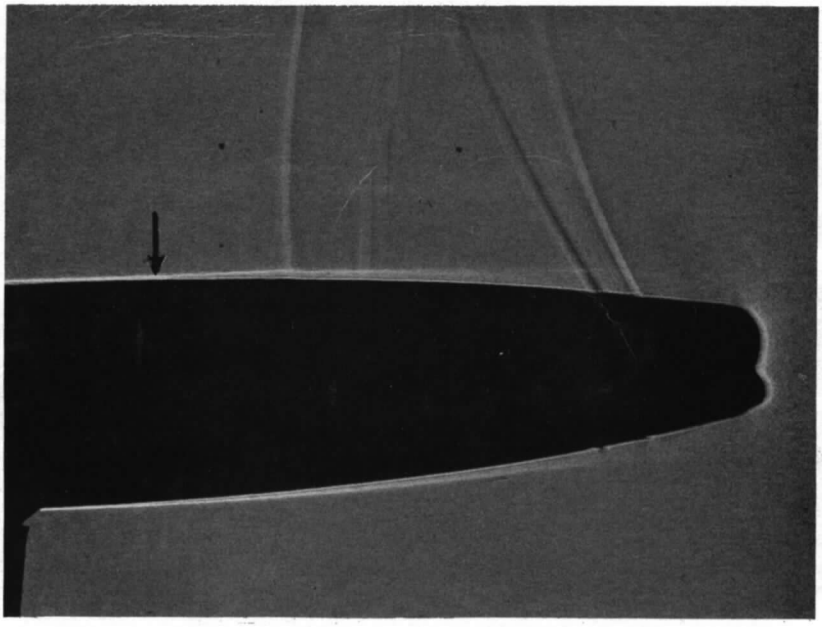


M = 0.79 $\alpha = 2^{o}$

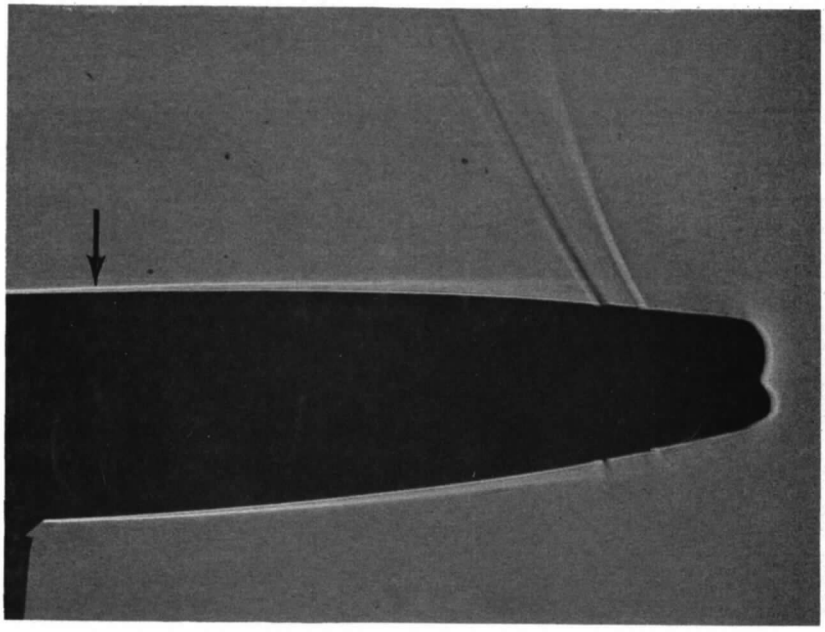


M = 0.75 $\alpha = 3^{o}$

Fig.2 Direct shadow pictures showing transition — 9515



M = 0.77 $\alpha = 1.18^{o}$



M = 0.79 $\alpha = 1.18^{o}$

Fig.3 Direct shadow pictures showing transition — 9530

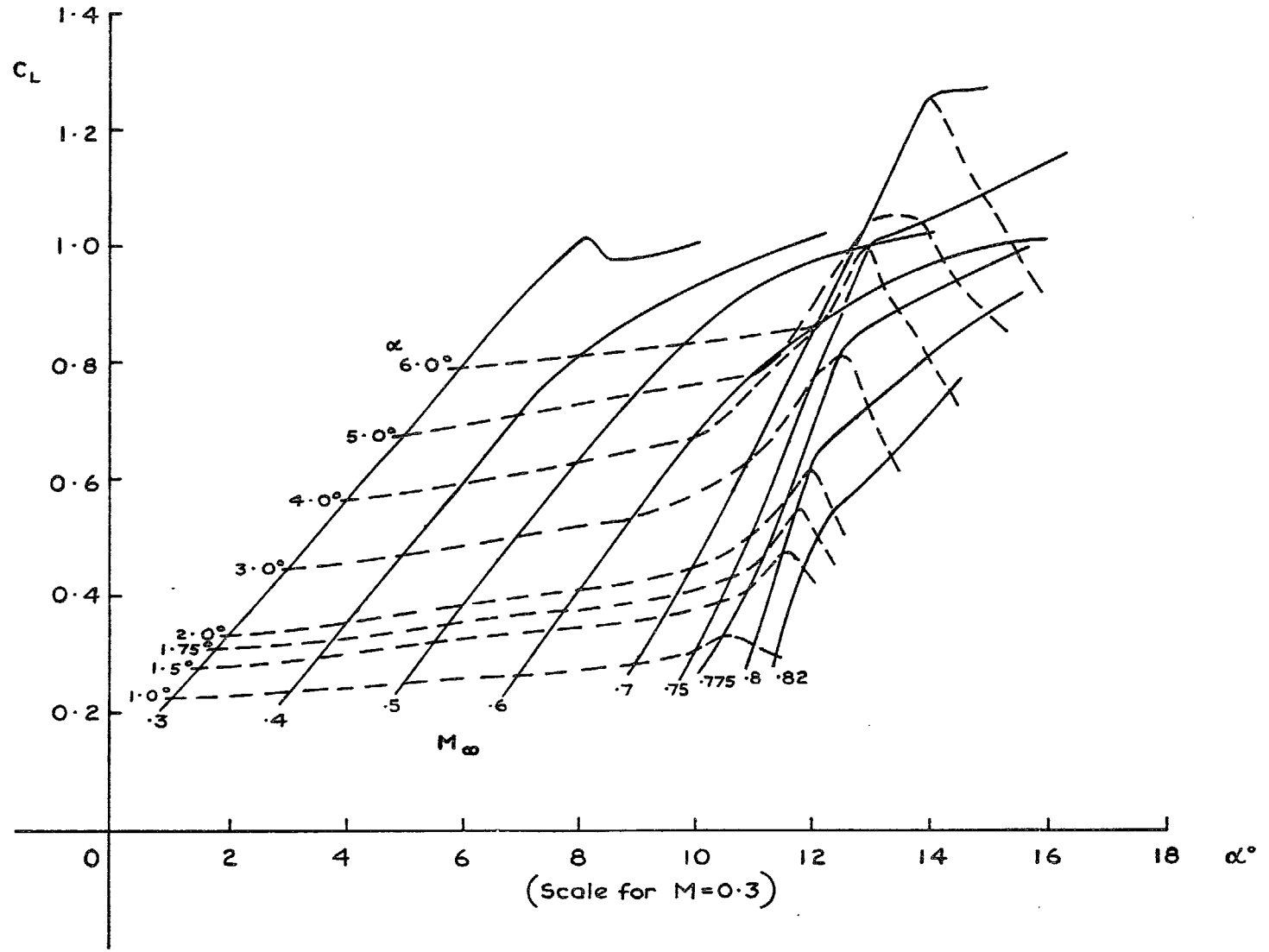


Fig 4 Variation of lift coefficient with incidence and Mach number — 9515

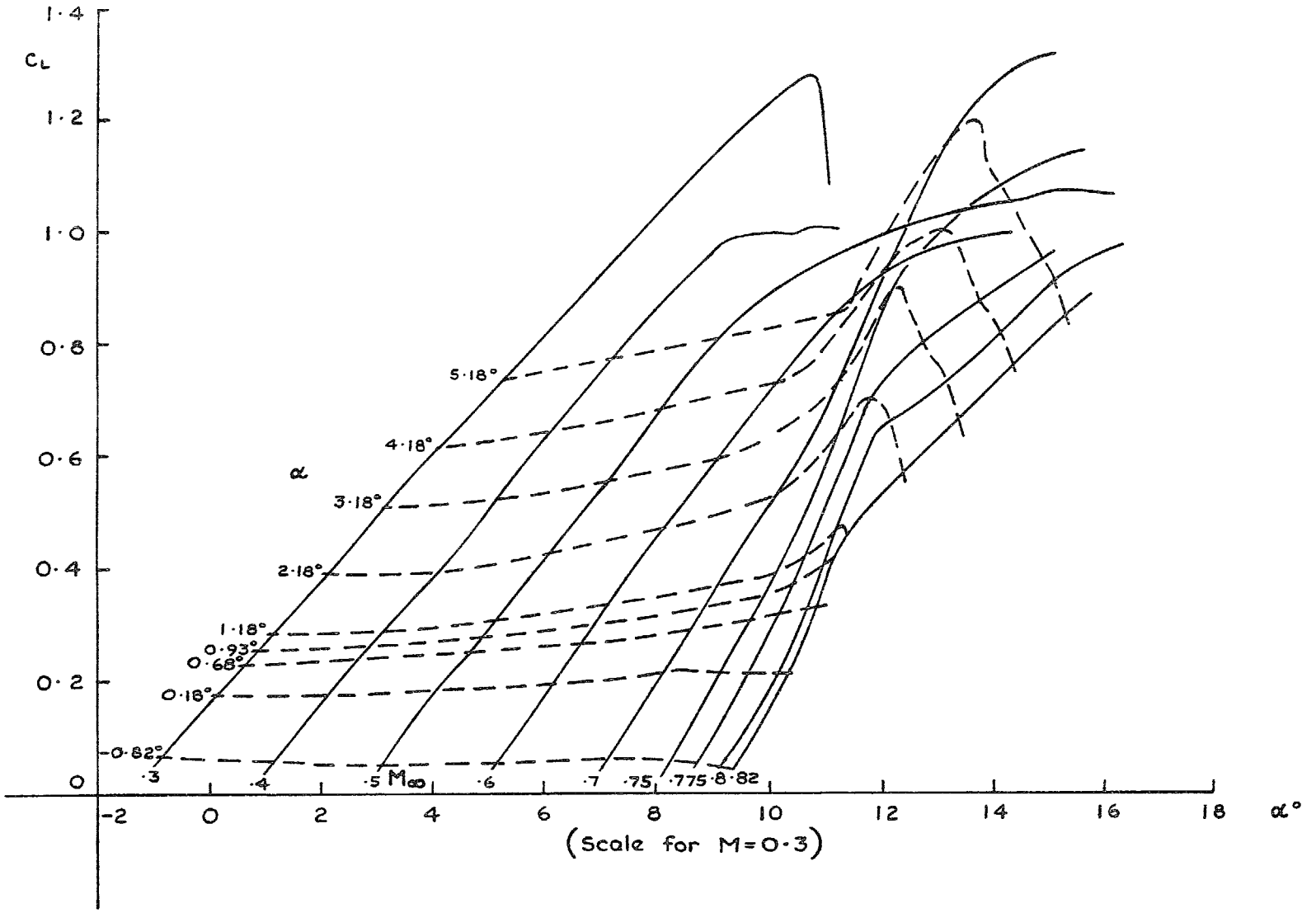


Fig 5 Variation of lift coefficient with incidence and Mach number — 9530

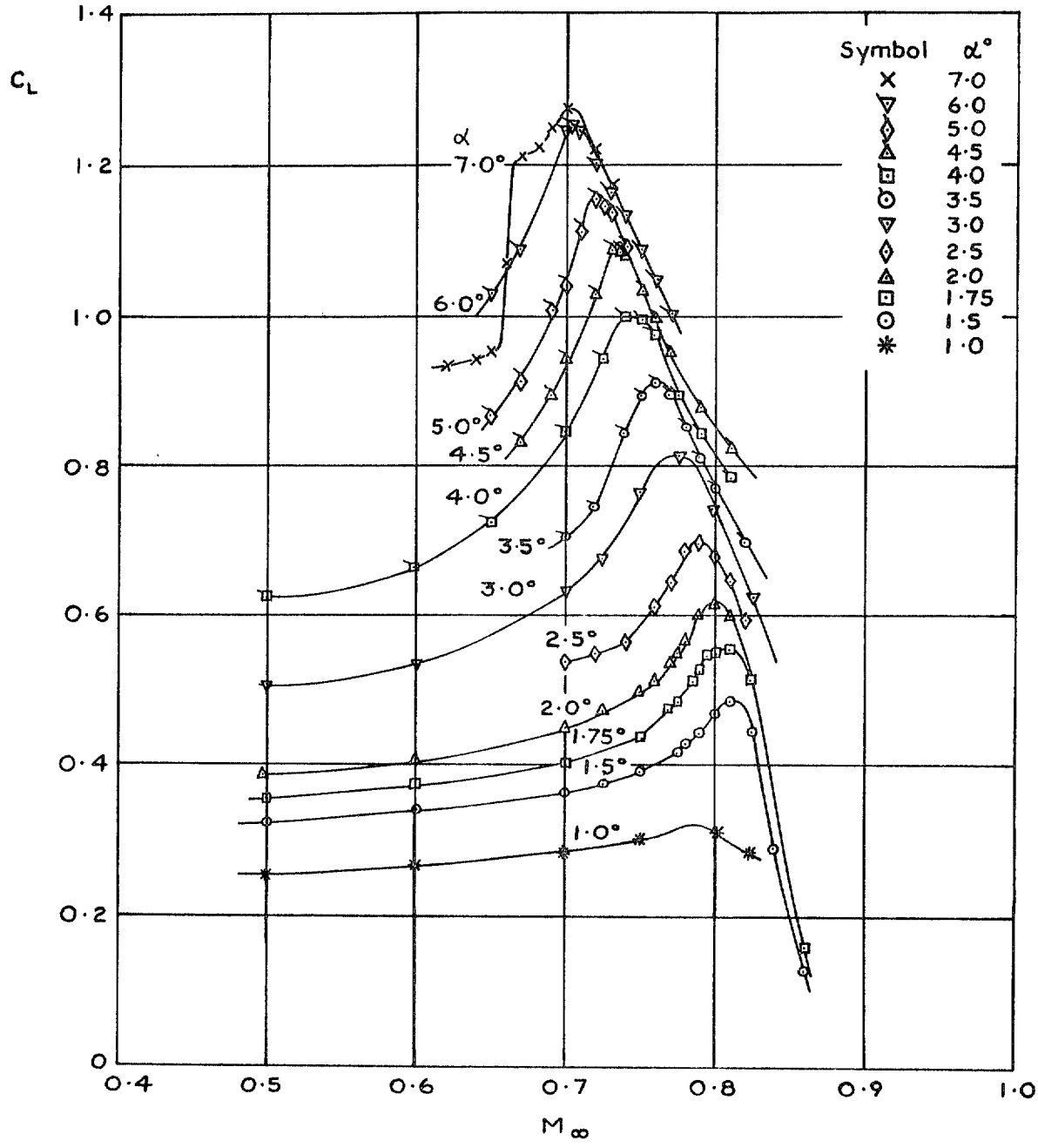


Fig 6 Variation of lift coefficient with Mach number — 9515

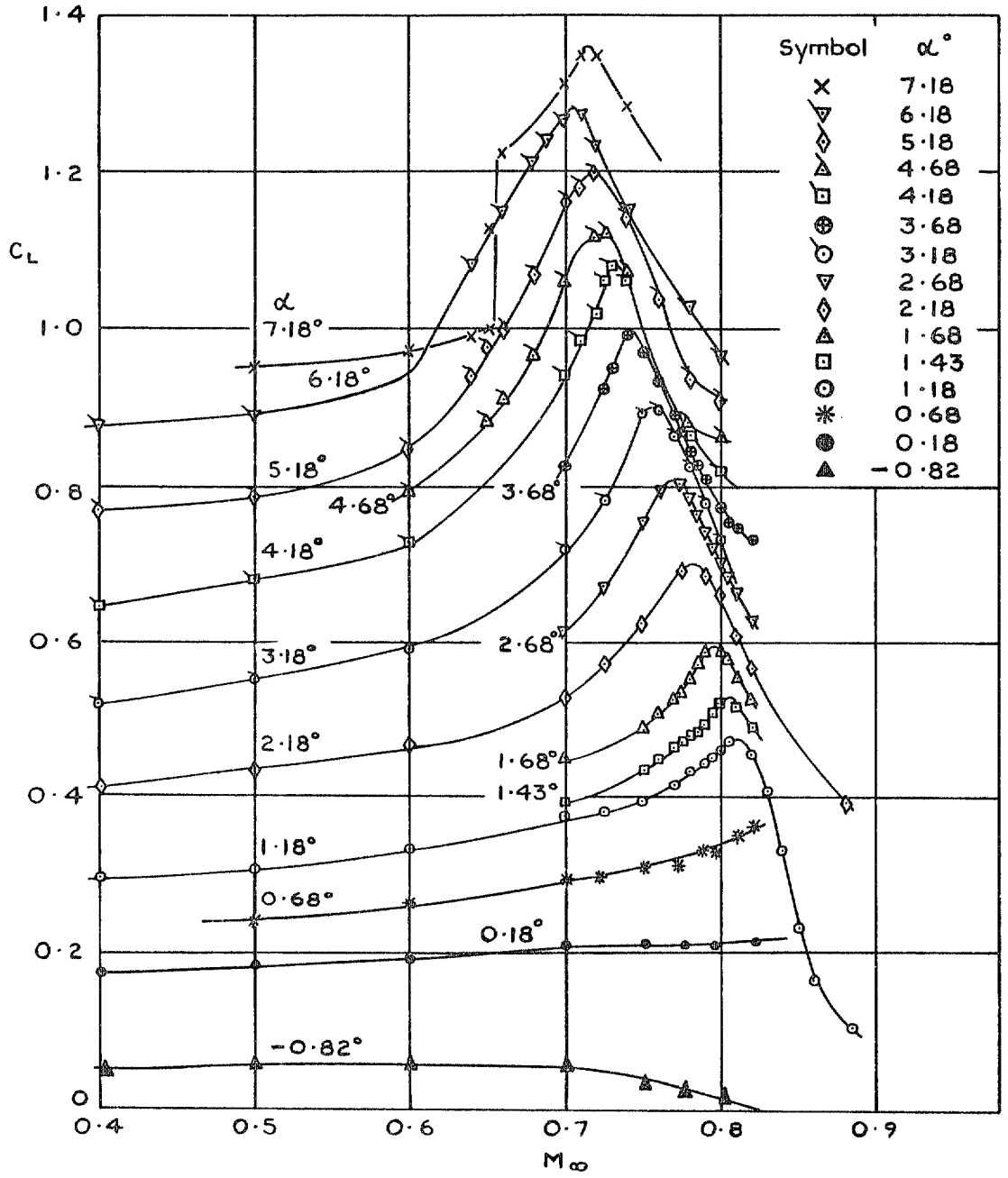


Fig 7 Variation of lift coefficient with Mach number – 9530

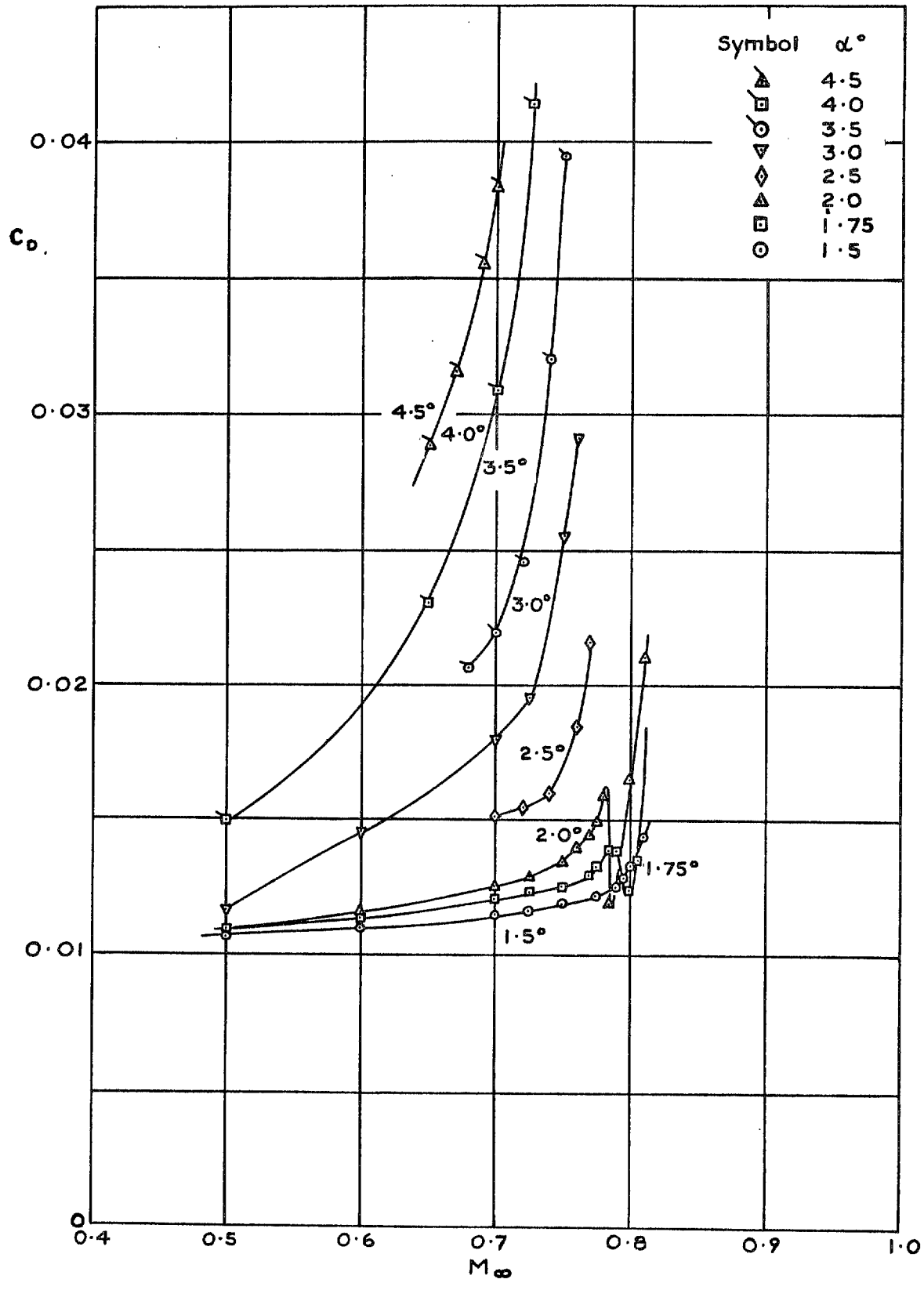


Fig 8 Variation of drag coefficient with Mach number — 9515

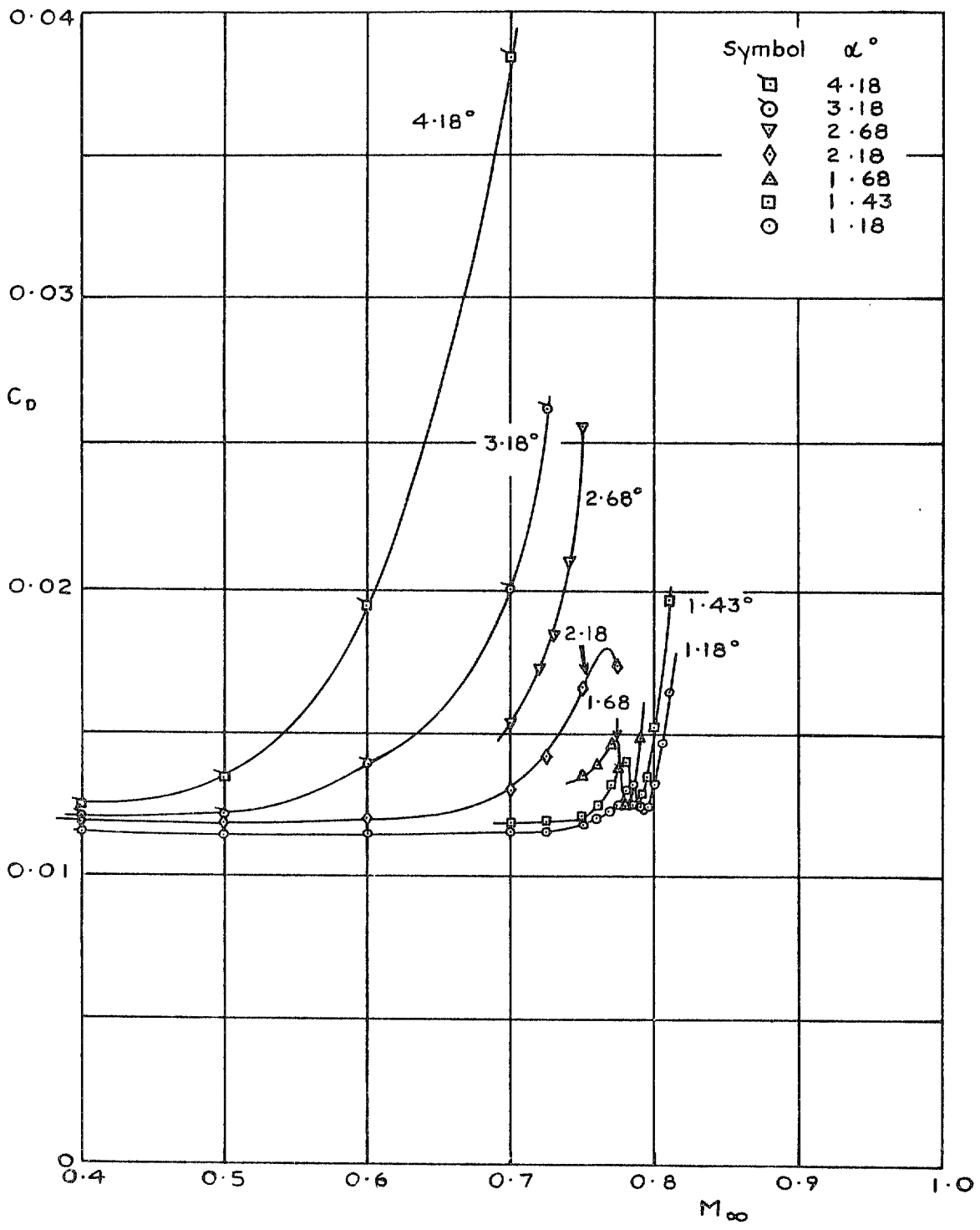


Fig 9 Variation of drag coefficient with Mach number – 9530

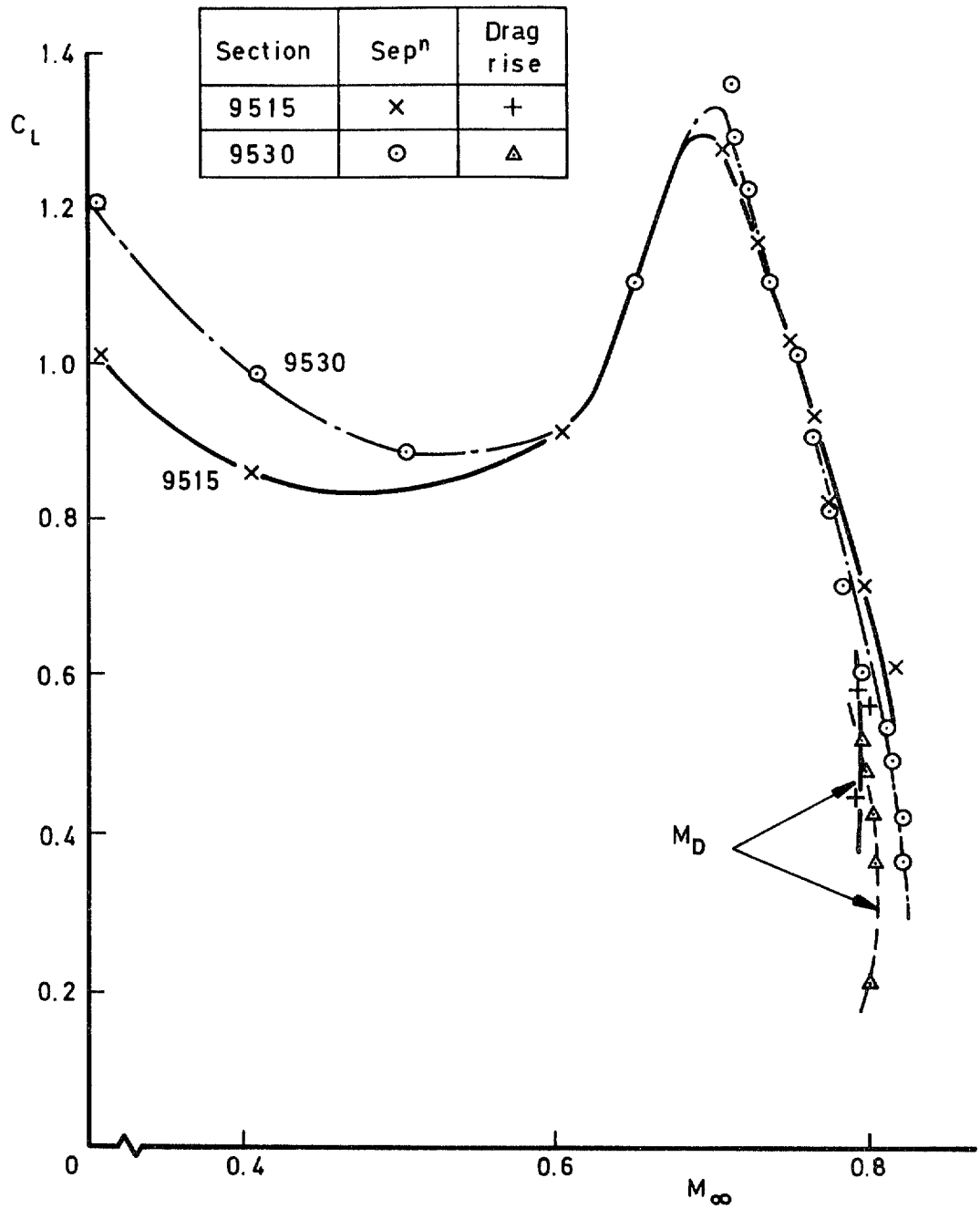


Fig 10 Comparison of separation (buffet) boundaries

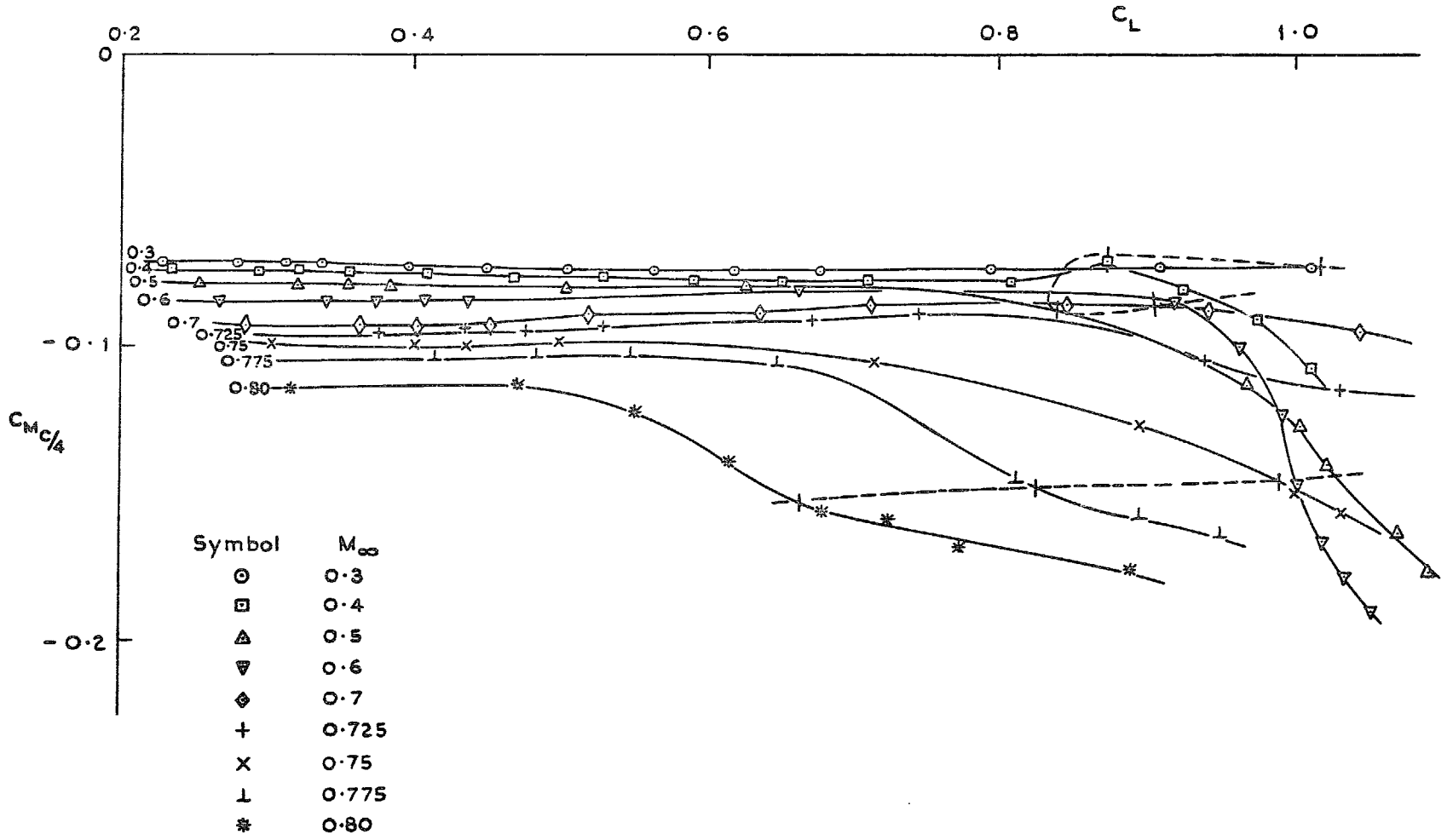


Fig 11 Variation of pitching moment coefficient with lift coefficient and Mach number — 9515

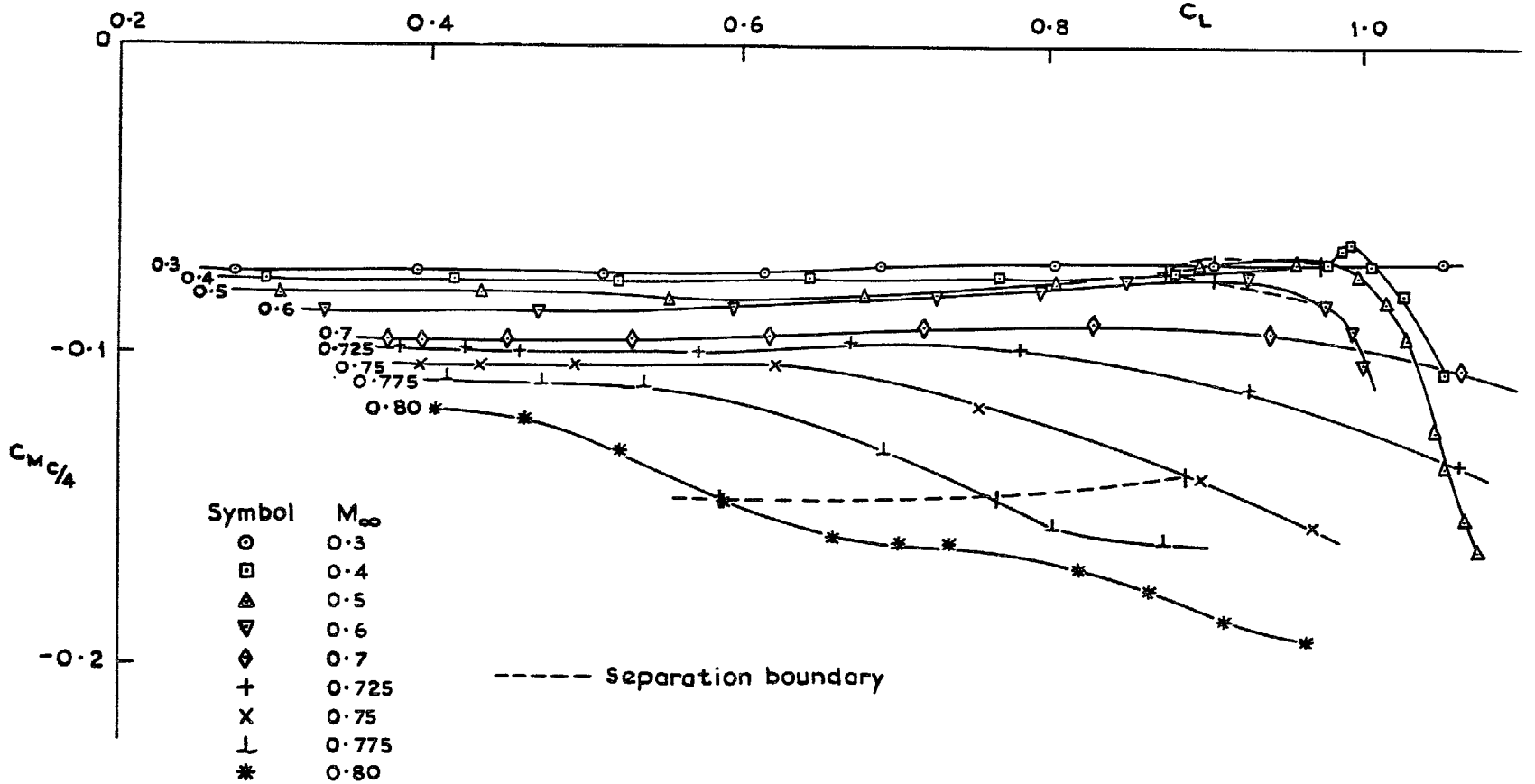


Fig 12 Variation of pitching moment coefficient with lift coefficient and Mach number – 9530

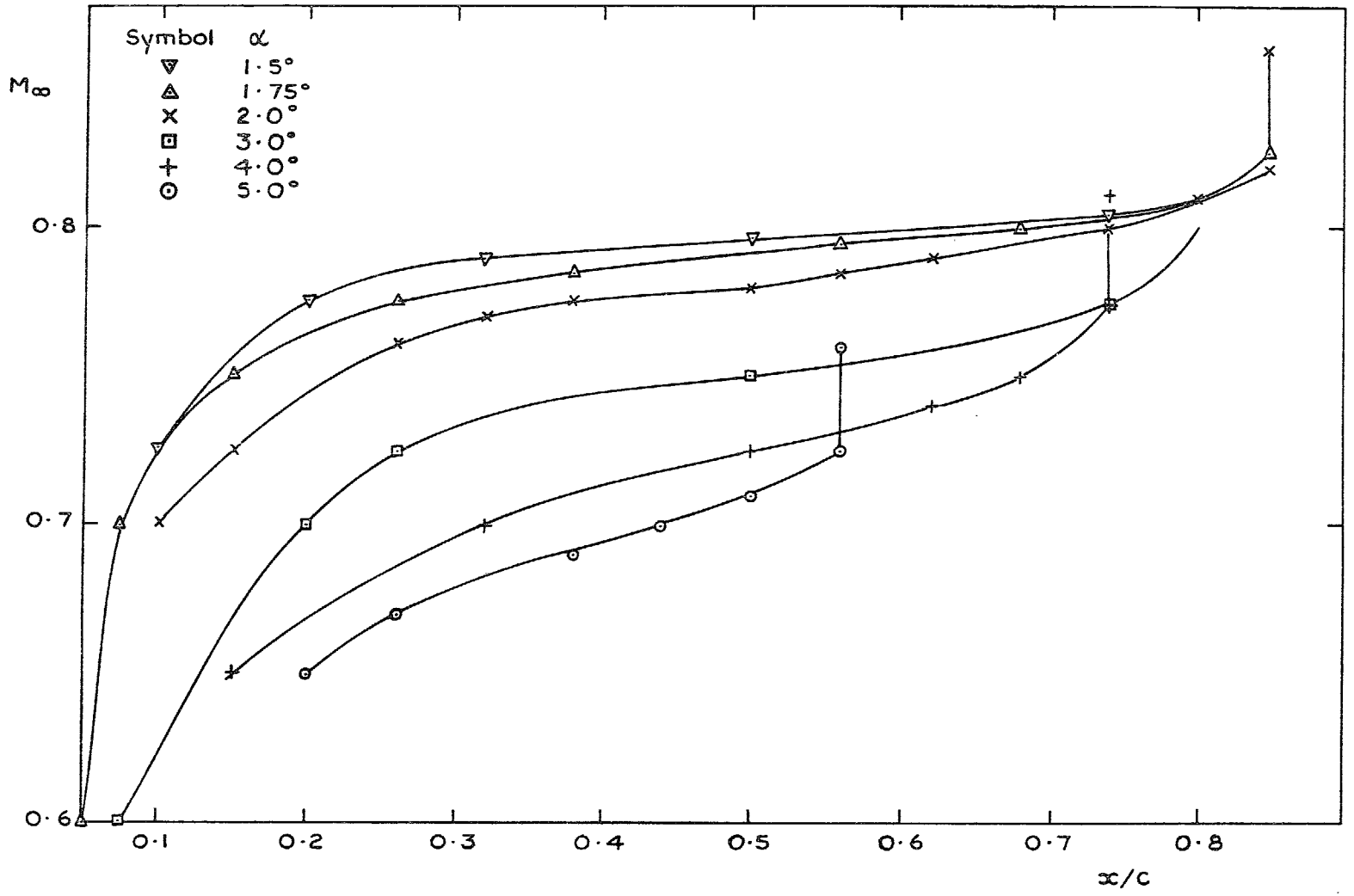


Fig 13 Position of principal upper surface shock — 9515

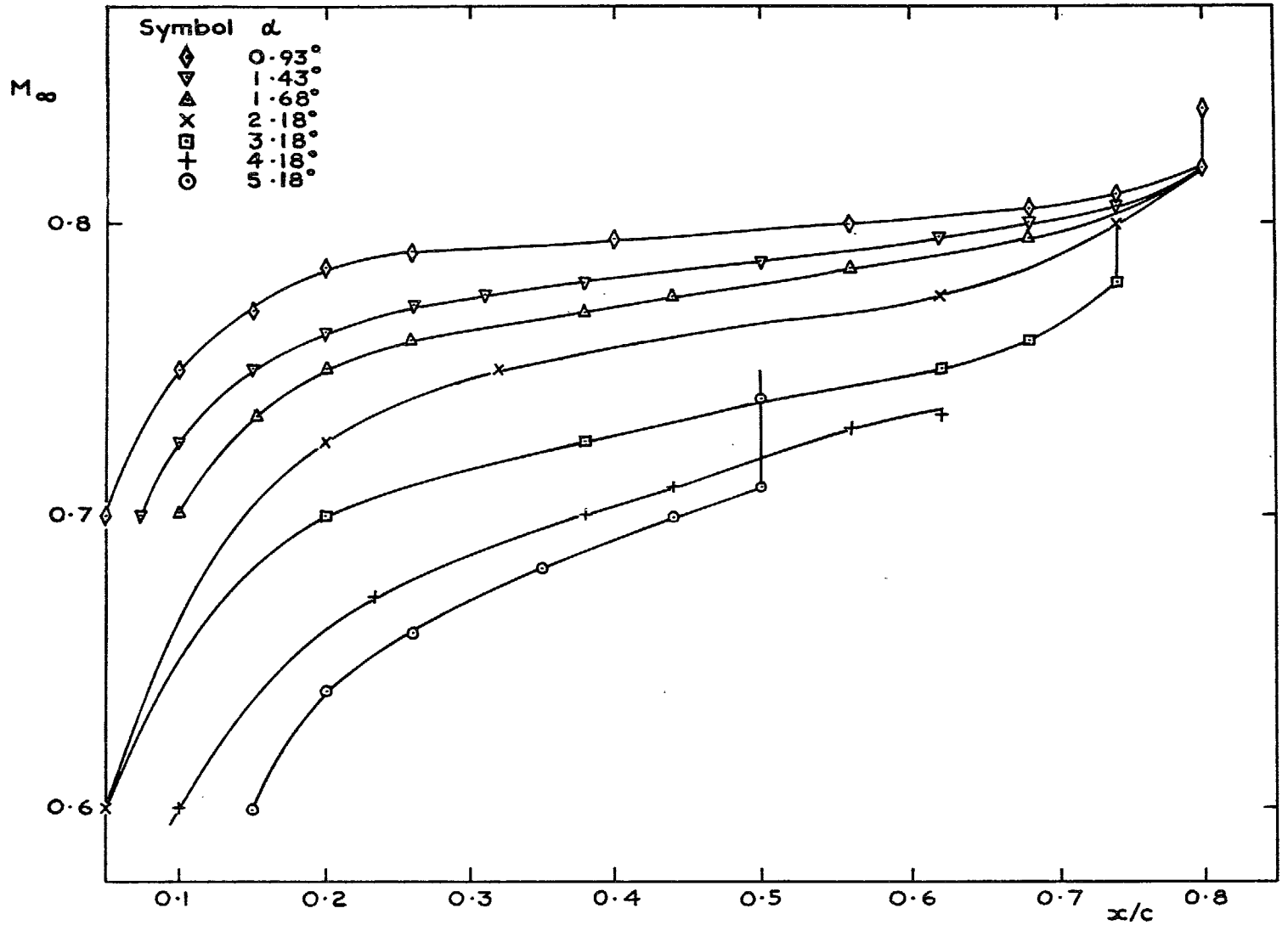


Fig 14 Position of principal upper surface shock — 9530

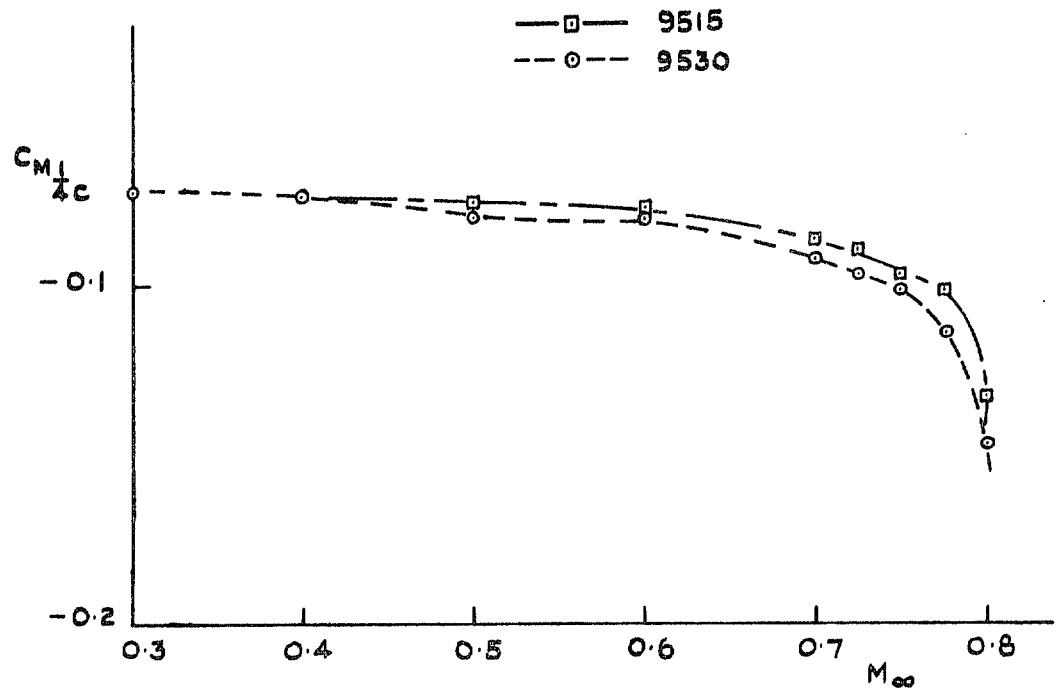


Fig 15 Variation of pitching moment with Mach number at constant lift coefficient (C_L = 0.6)

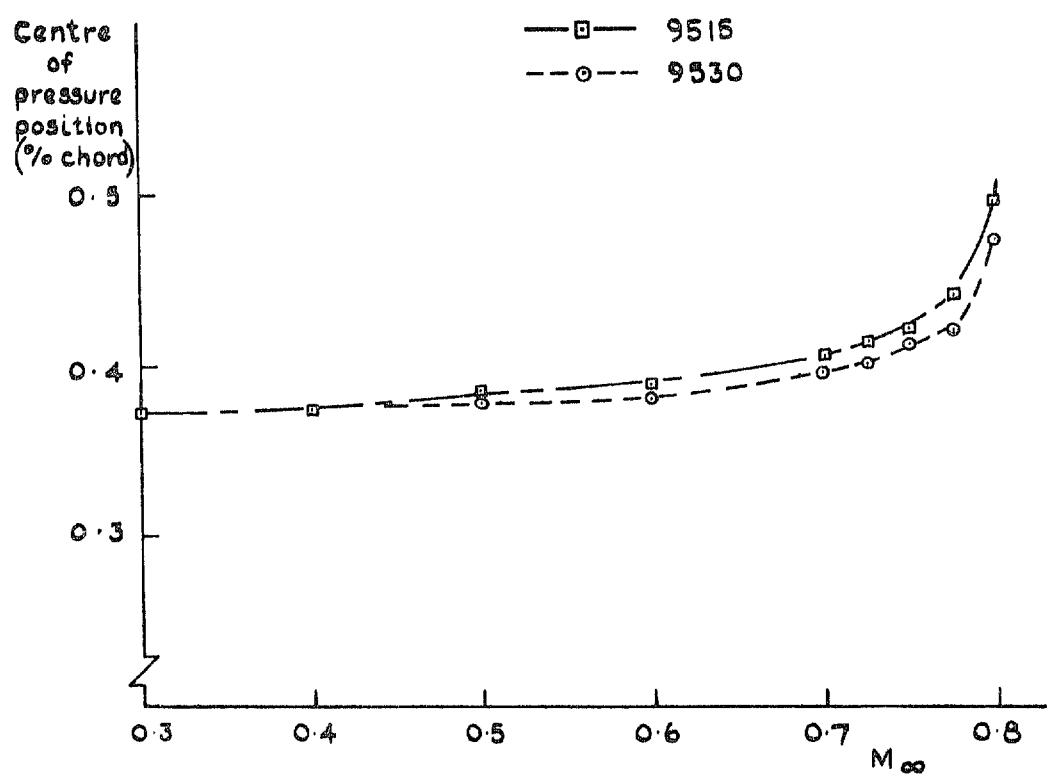


Fig 16 Position of centre of pressure at constant lift coefficient (C_L = 0.6)

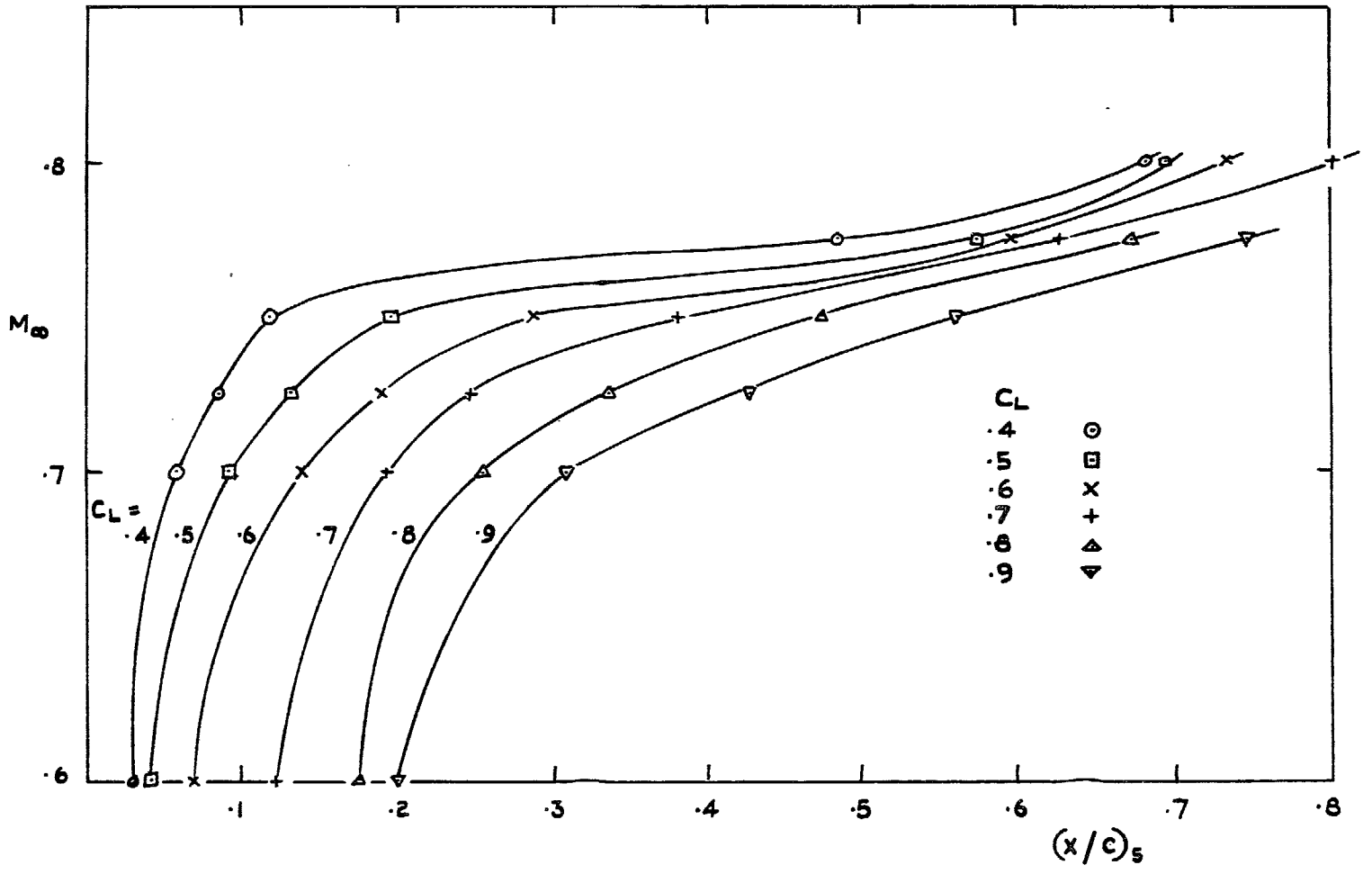


Fig 17 Variation in position of upper surface shock with M_∞ at constant C_L – 9515

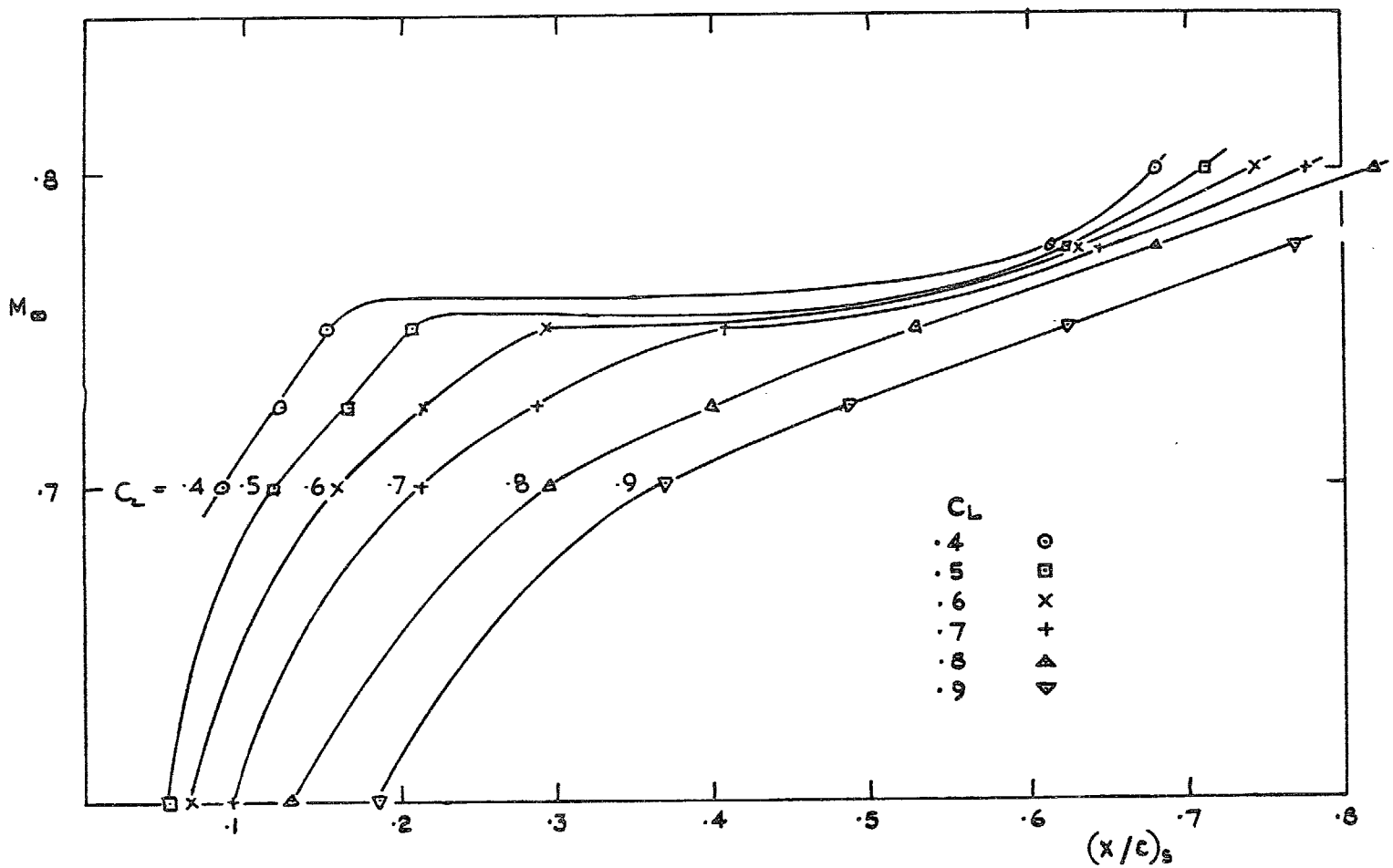


Fig 18 Variation in position of upper surface shock with M_∞ at constant C_L — 9530

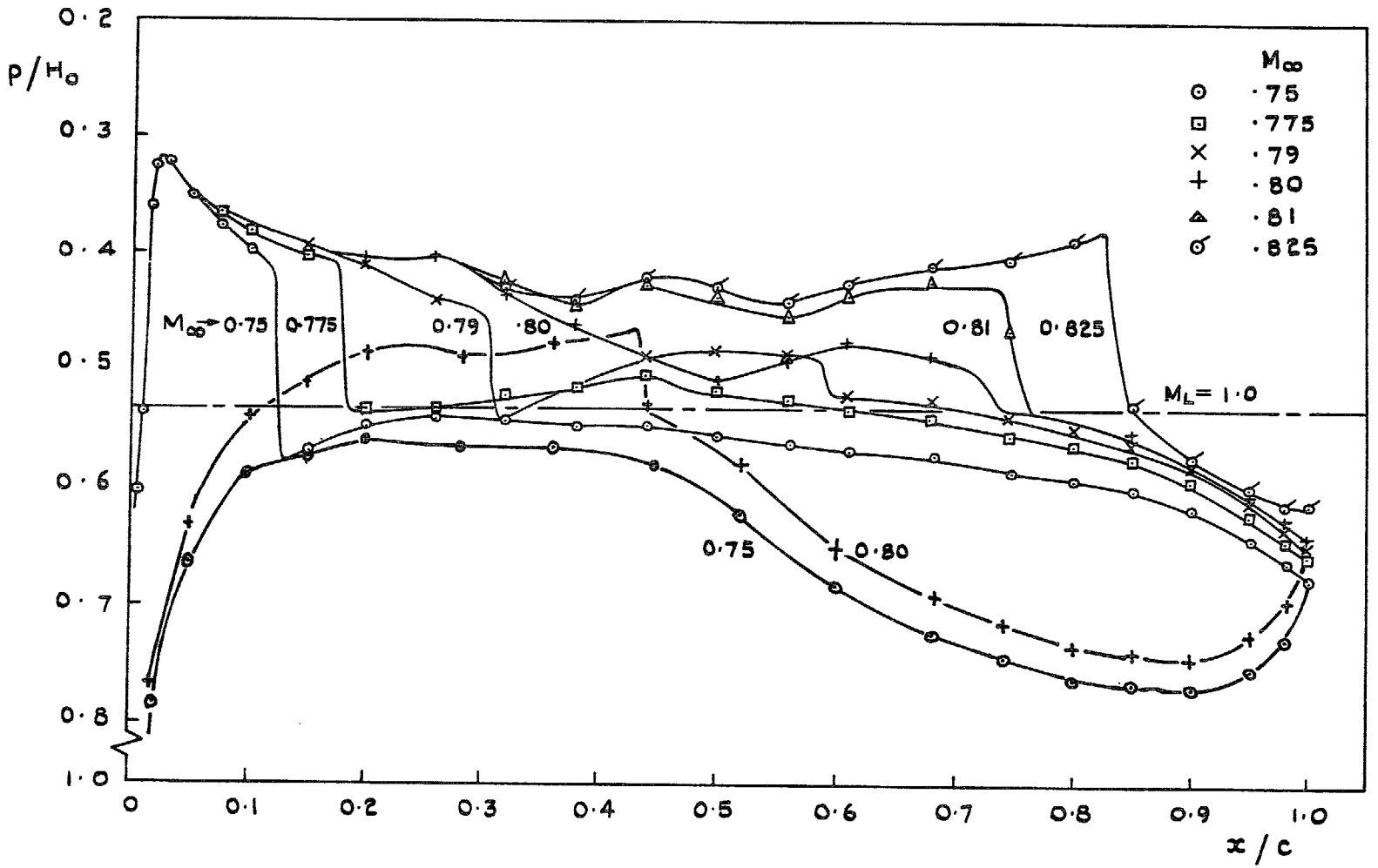


Fig 19 9515 — Pressure distributions $\alpha = 1.5°$

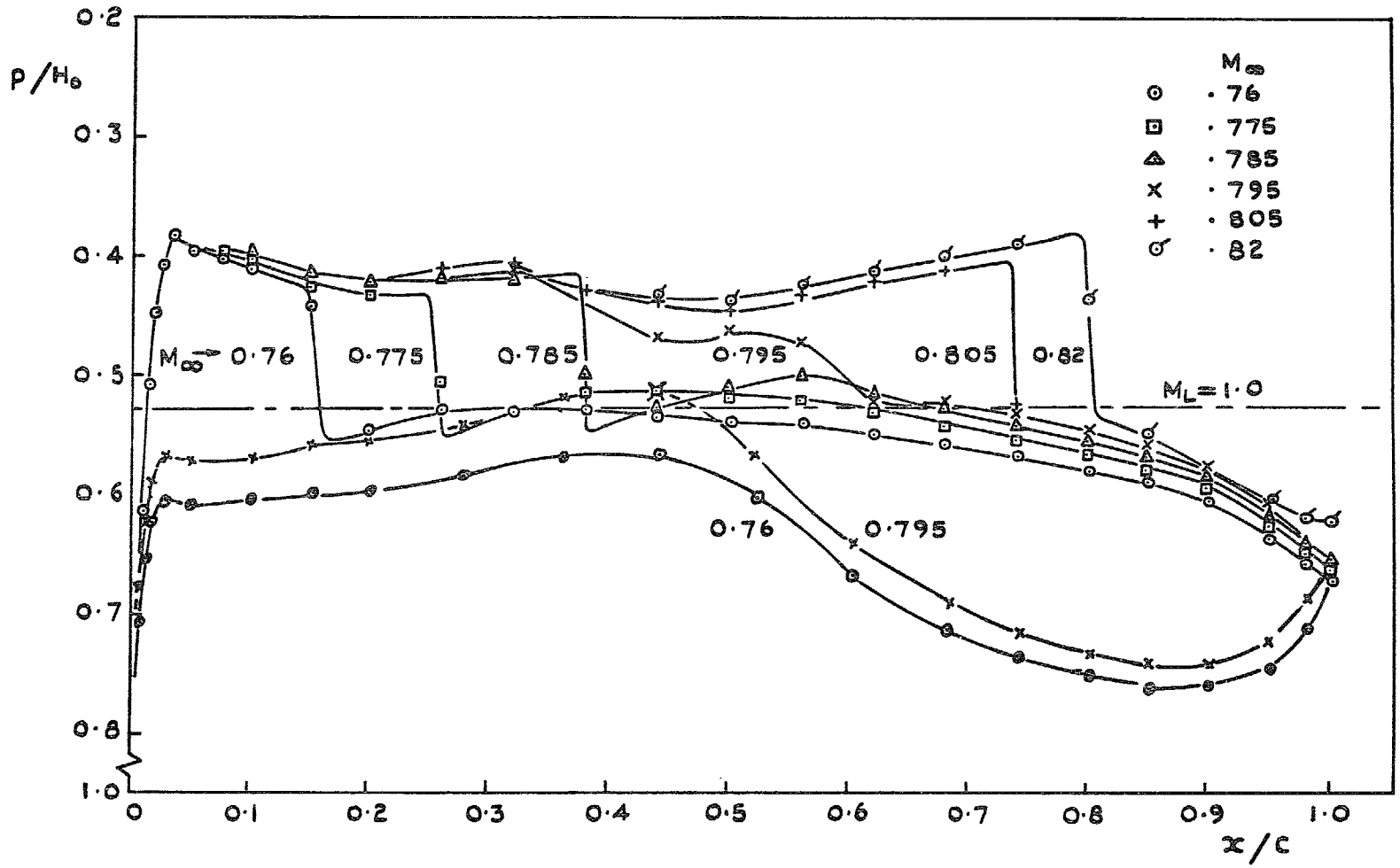


Fig 20 9530 — Pressure distributions $\alpha = 1.18°$

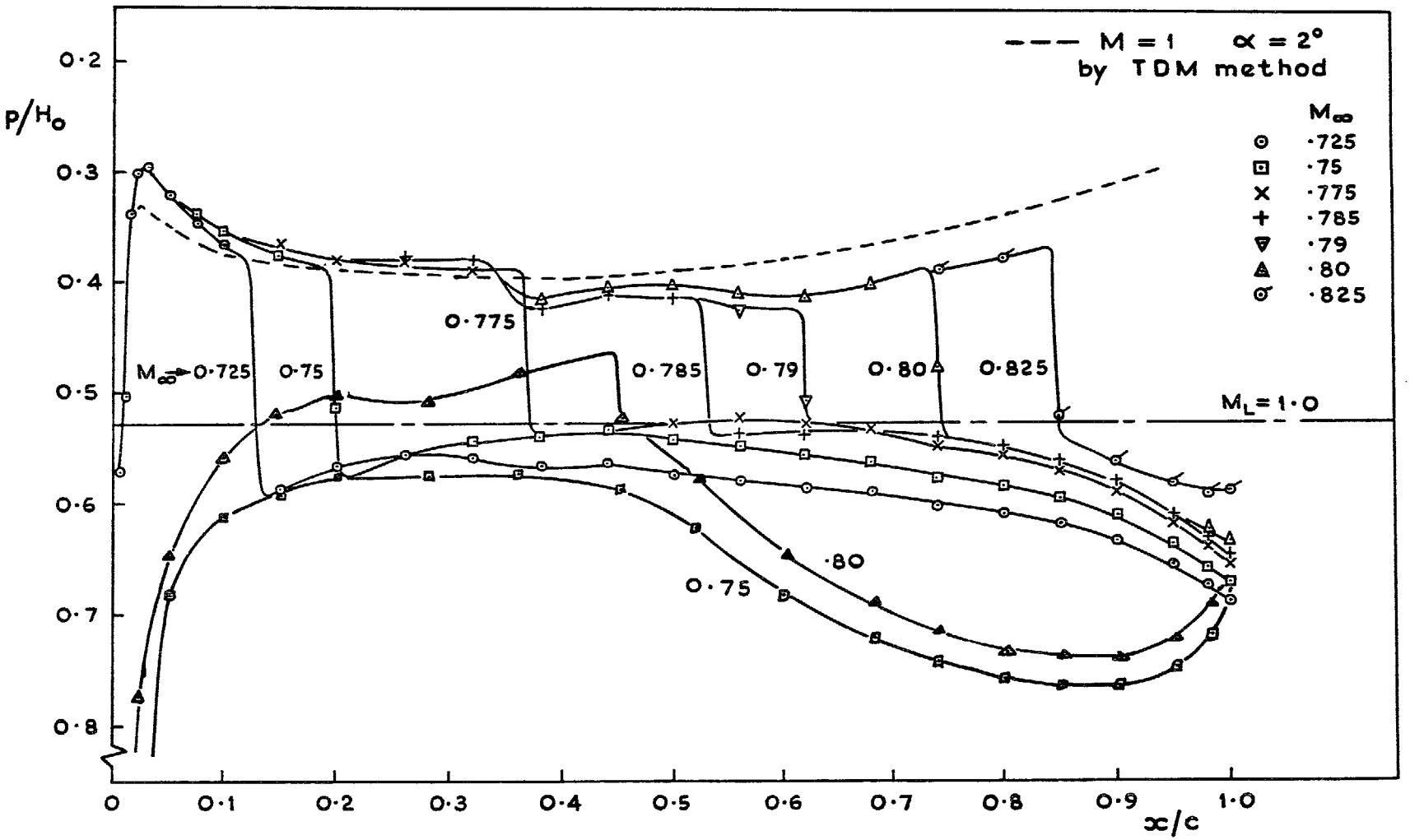


Fig 21 9515 — Pressure distributions $\alpha = 2°$

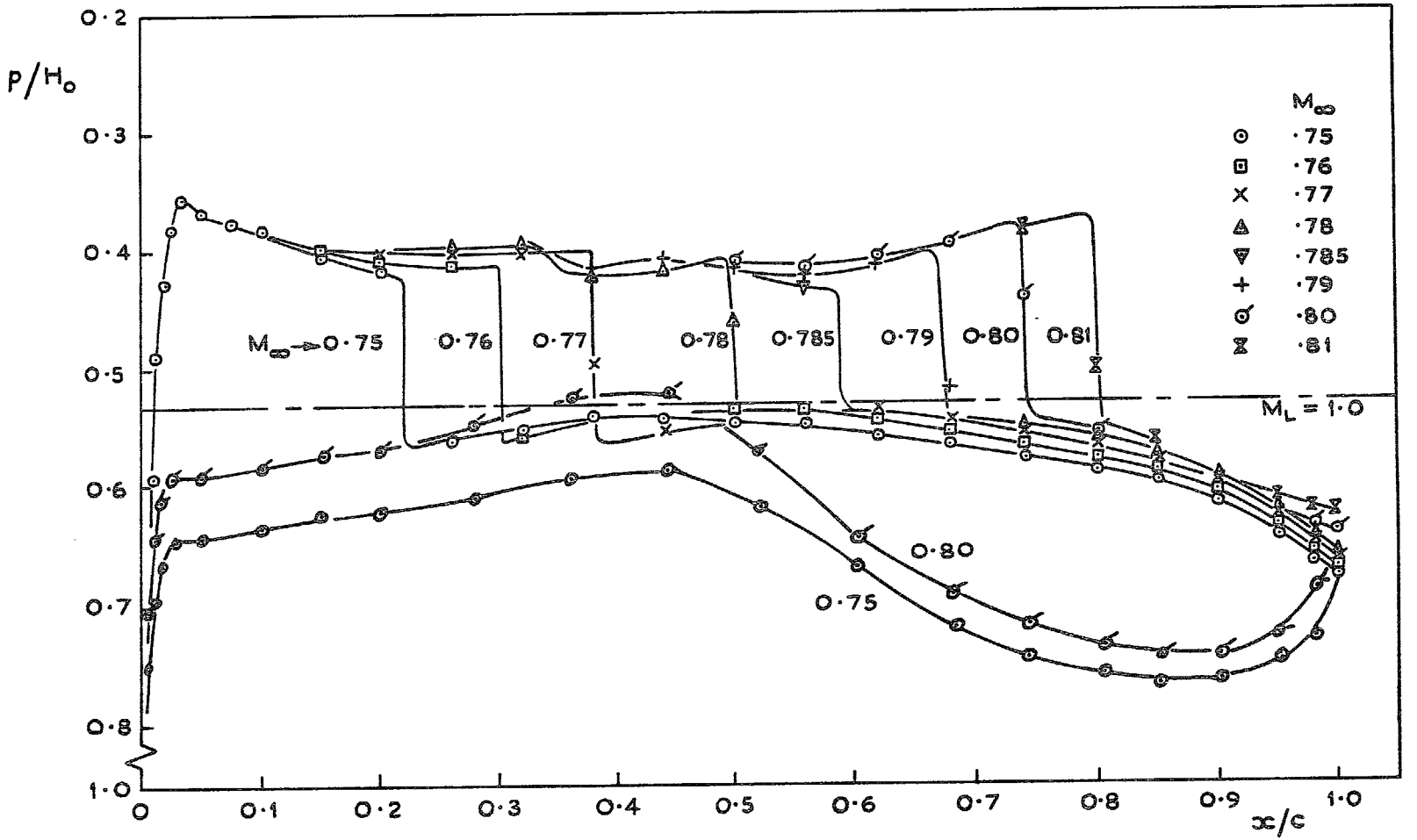


Fig 22 9530 — Pressure distributions $\alpha = 1.68°$

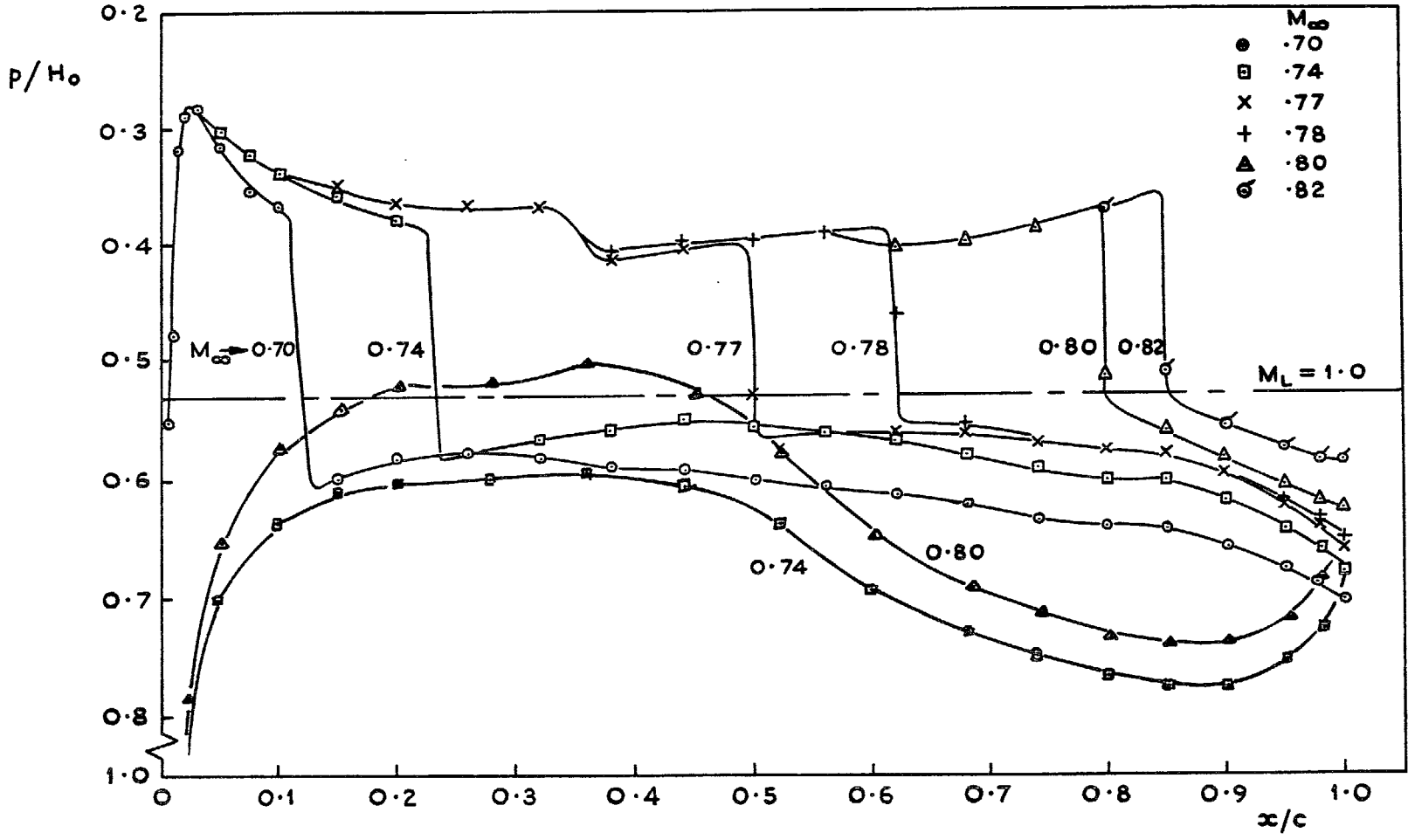


Fig 23 9515 — Pressure distributions $\alpha = 2.5°$

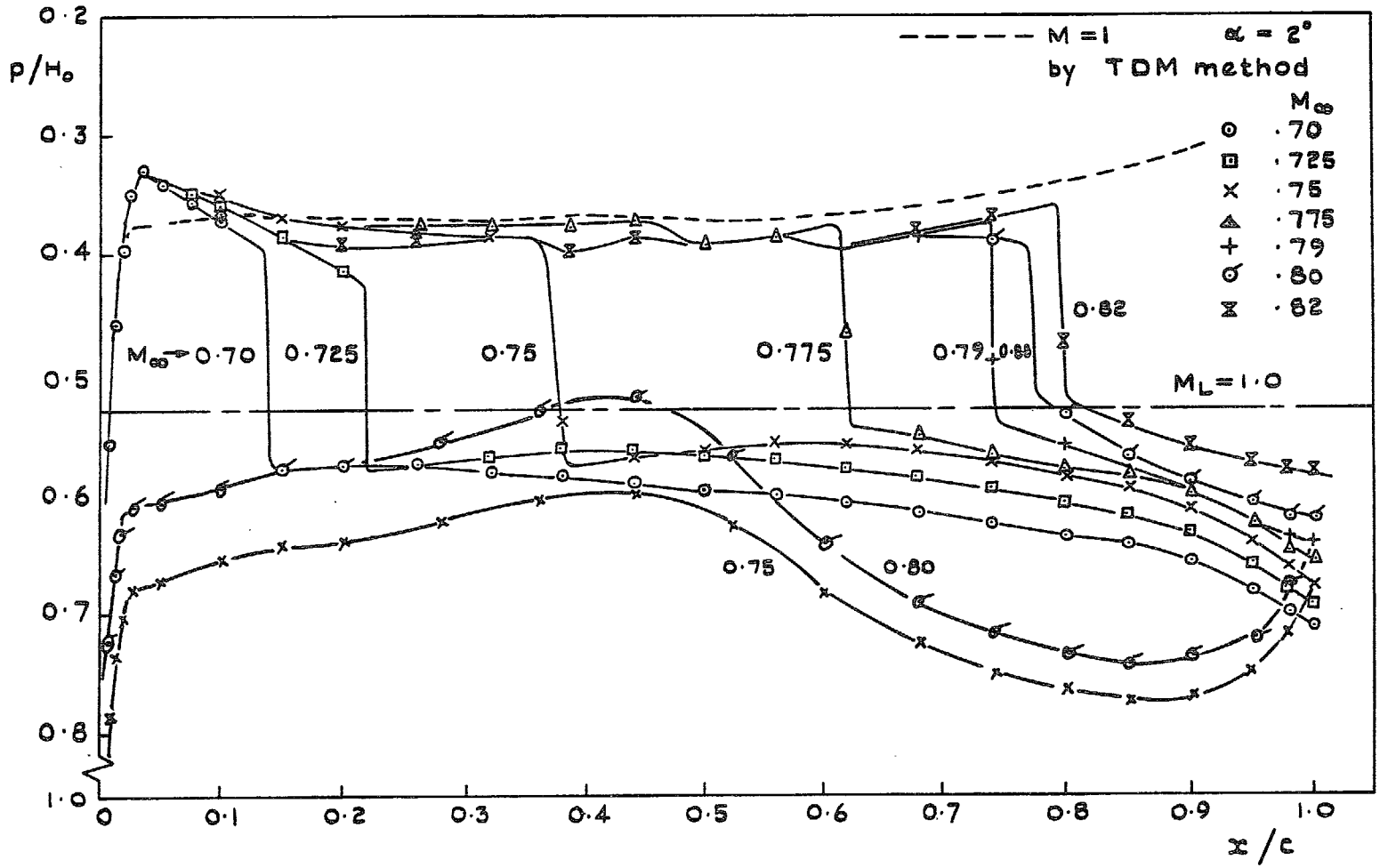


Fig 24 9530 — Pressure distributions $\alpha = 2.18°$

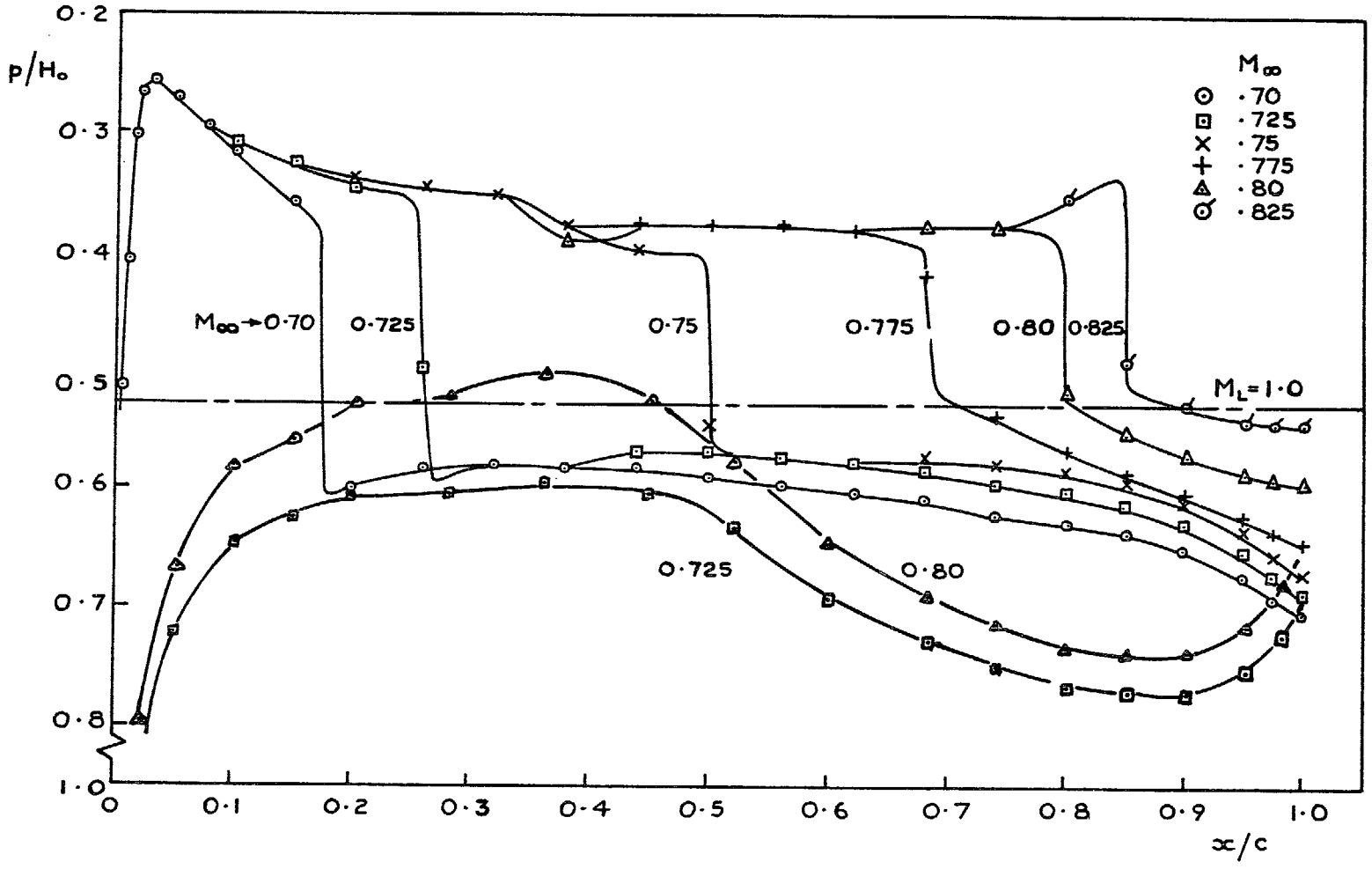


Fig 25 9515 — Pressure distributions $\alpha = 3°$

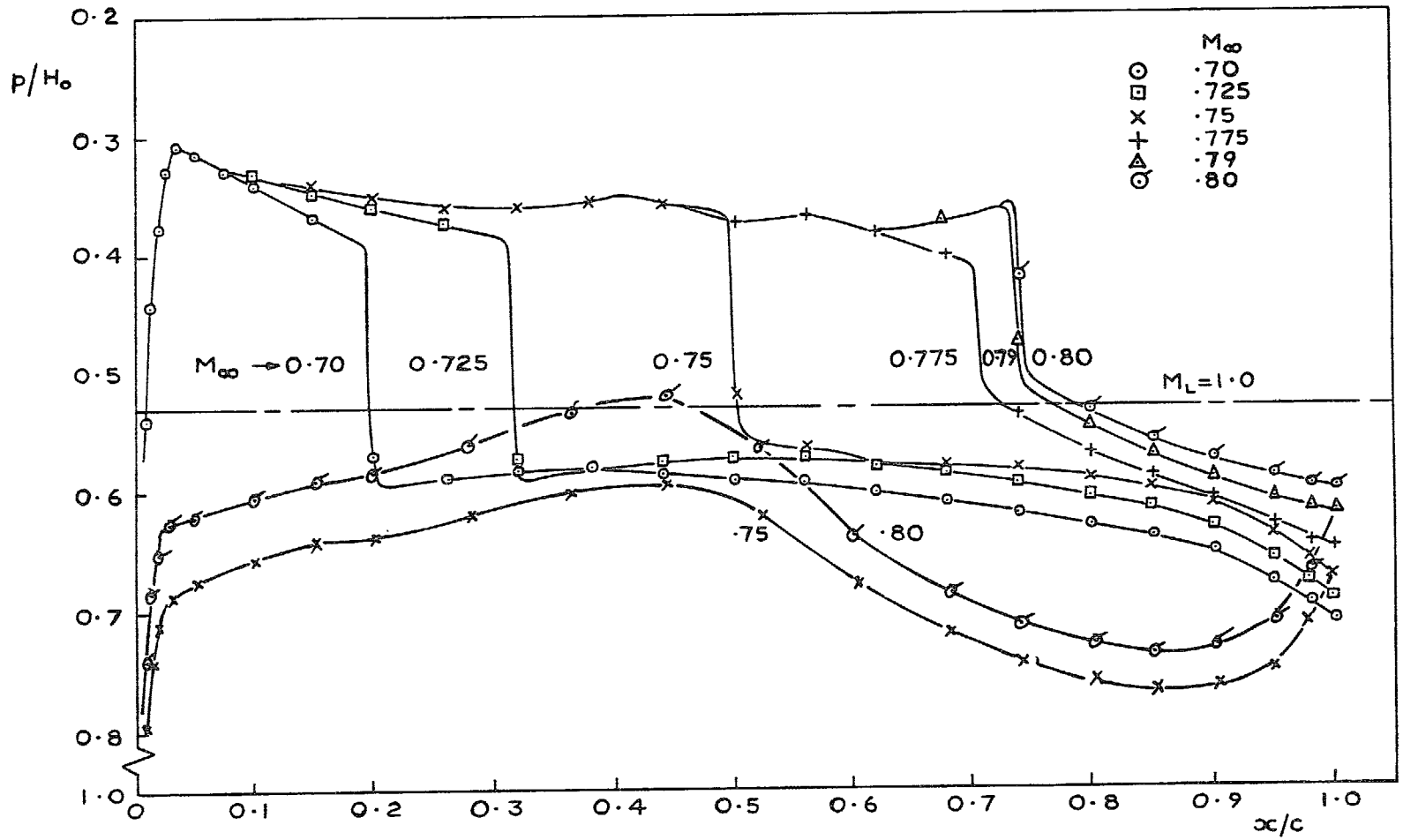


Fig 26 9530 — pressure distributions $\alpha = 2.68°$

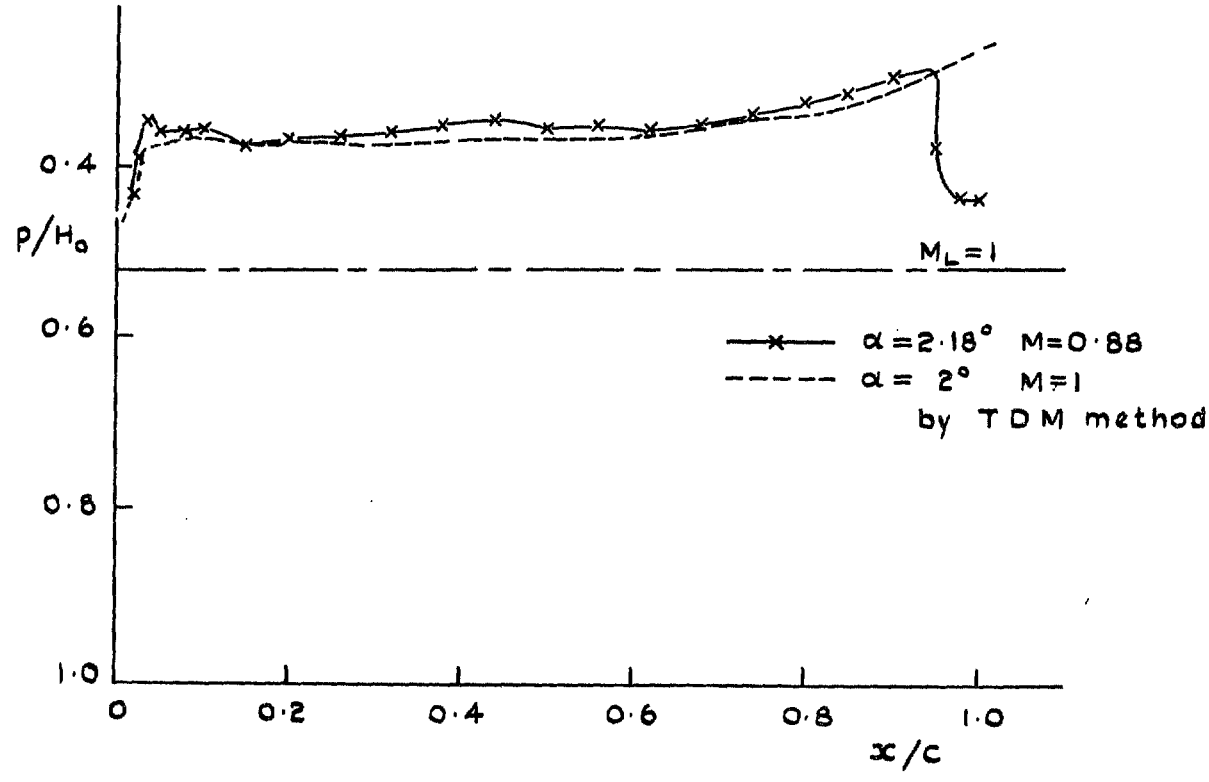


Fig 27 Comparison of predicted and experimental sonic-range pressure distribution – 9530

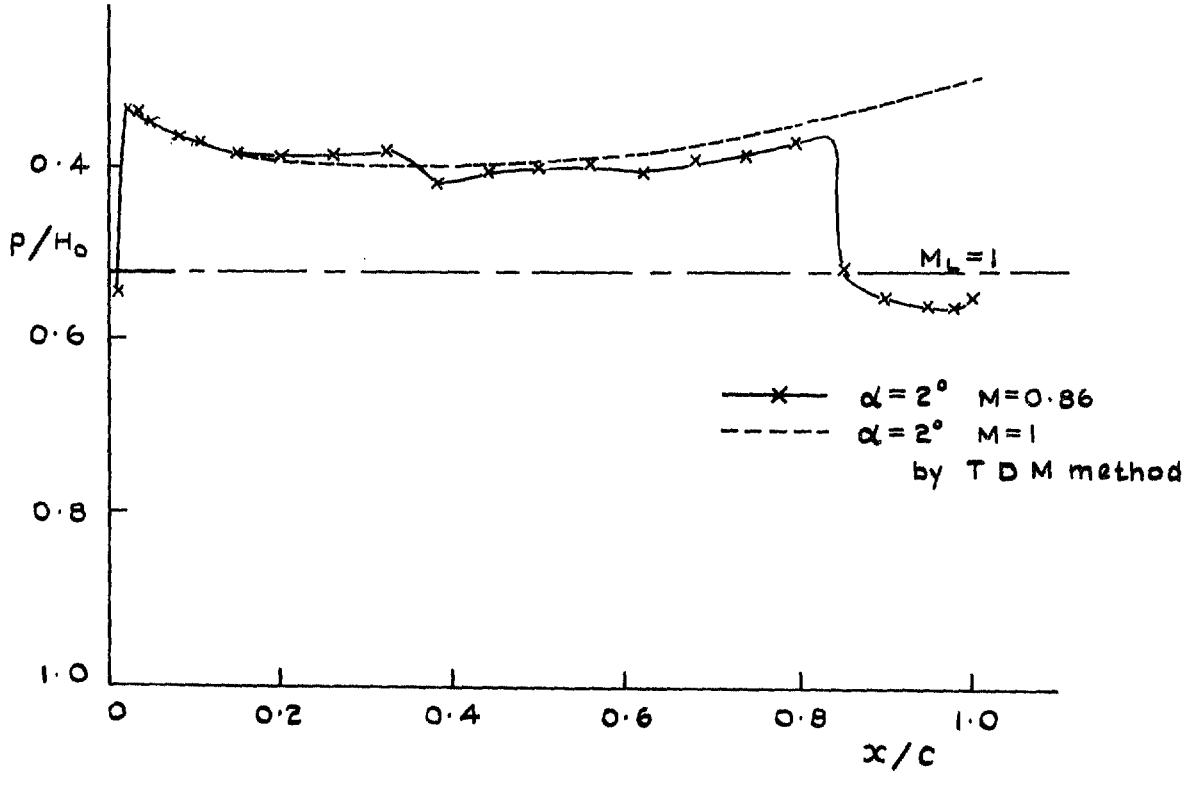


Fig 28 Comparison of predicted and experimental sonic-range pressure distribution – 9515

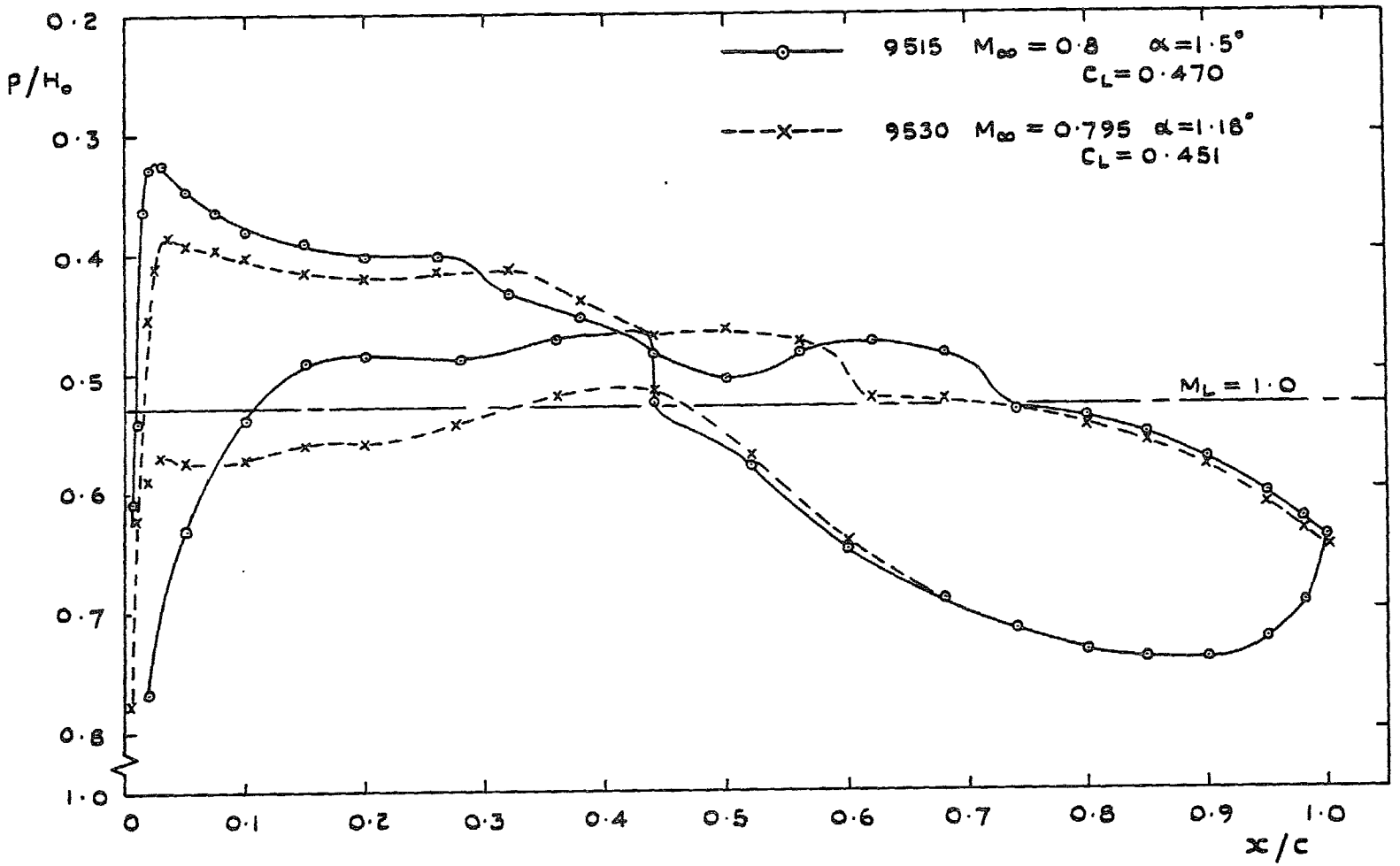


Fig 29 Comparison of pressure distributions at 'design' condition (M ≃ 0.80)

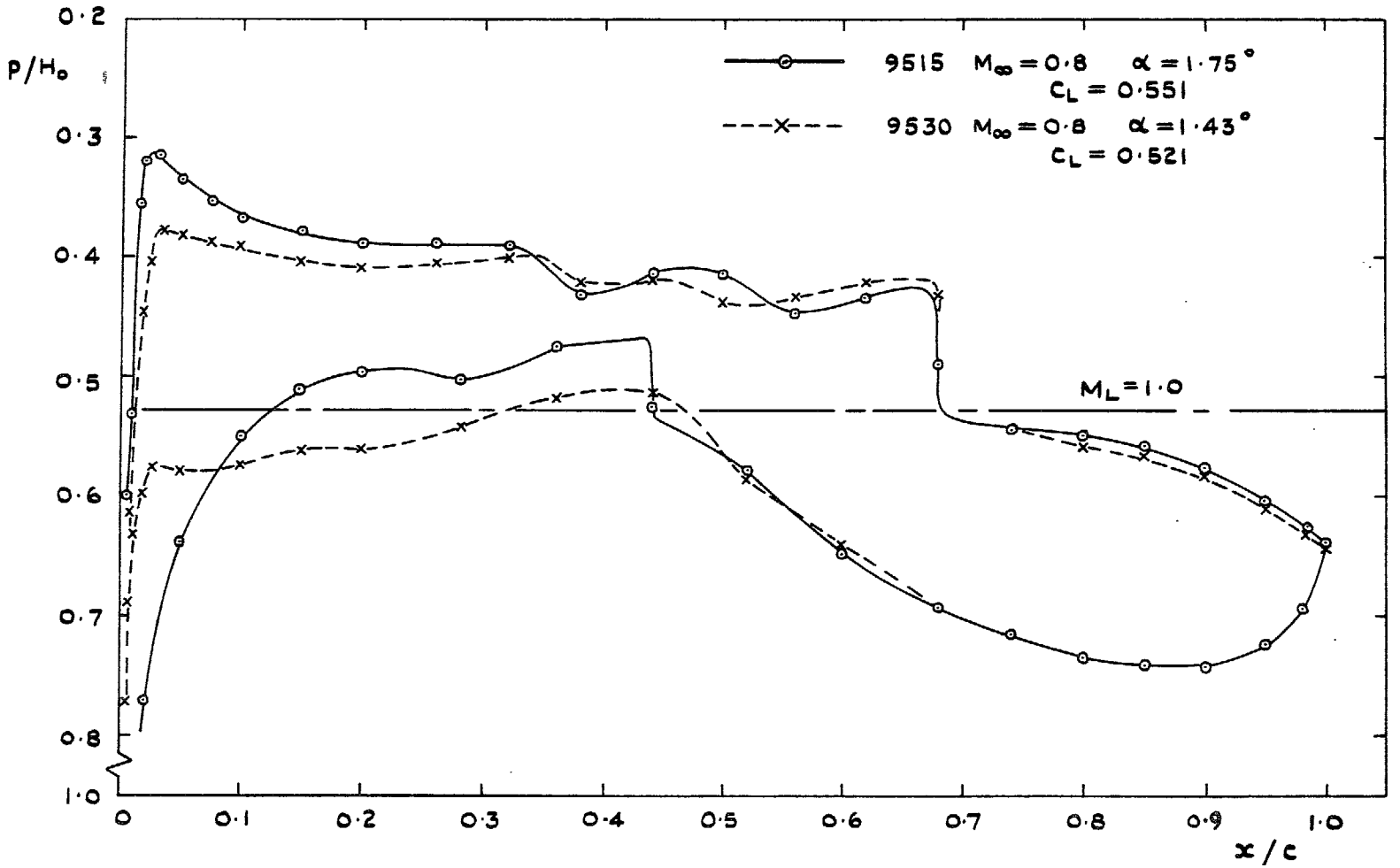


Fig 30 Comparison of pressure distributions at $C_L \simeq 0.5$. M = 0.80

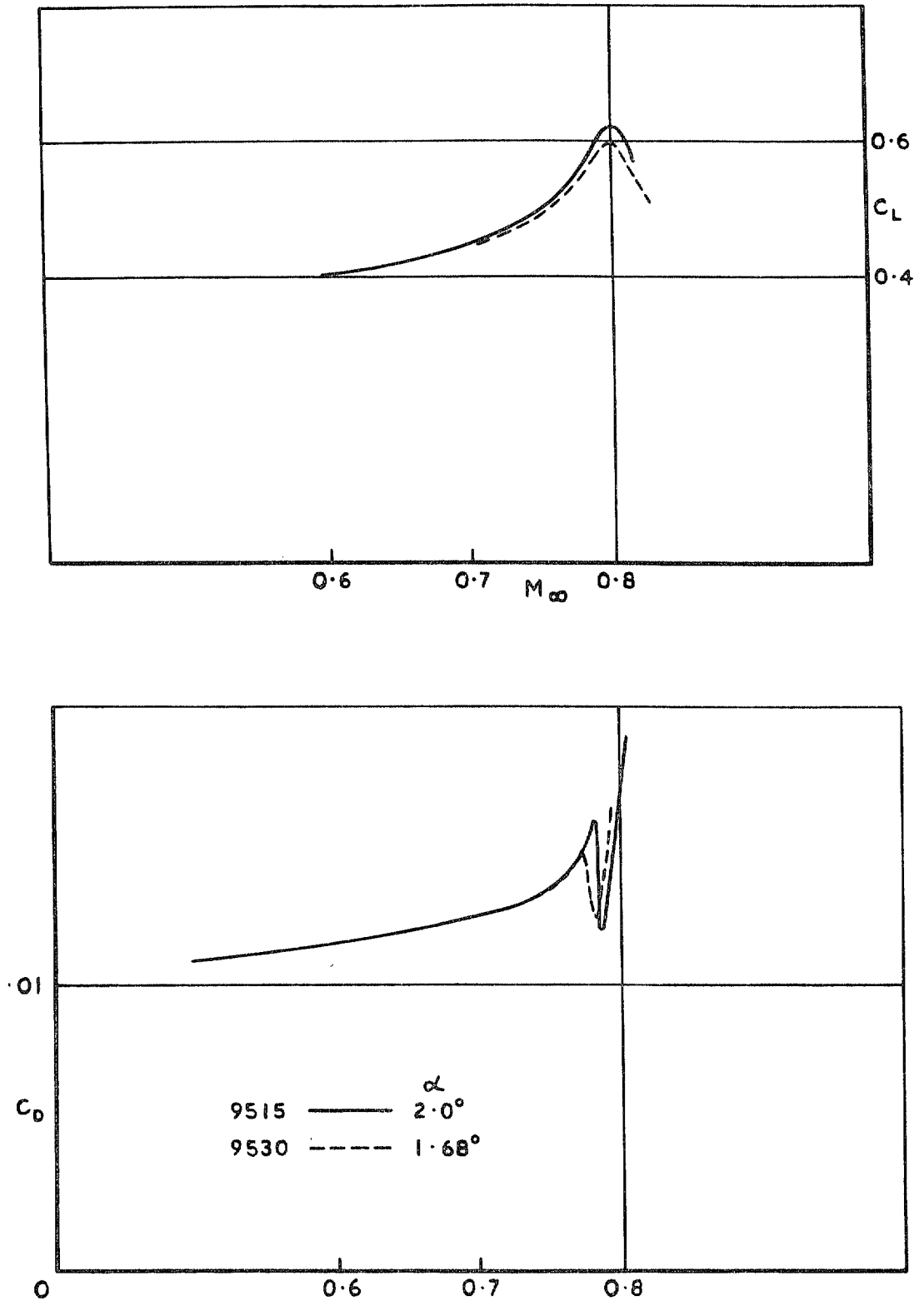
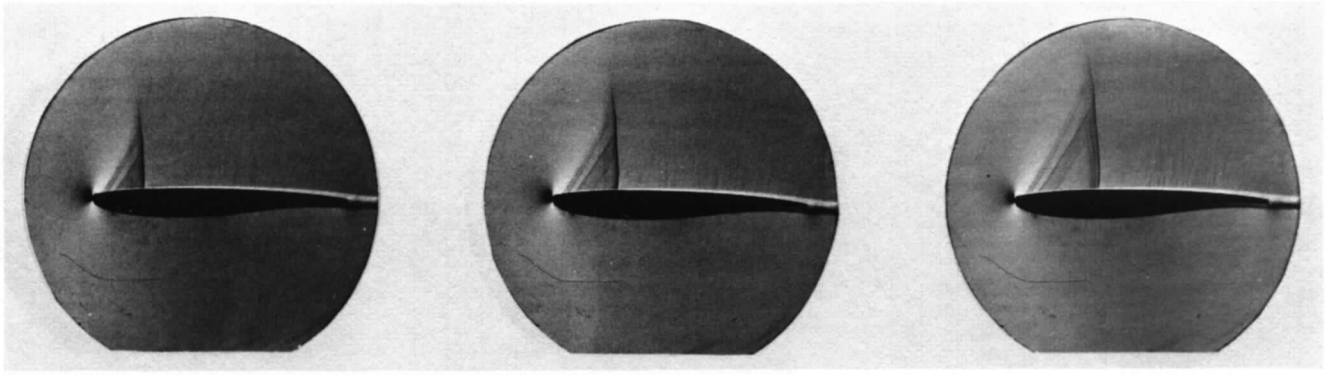
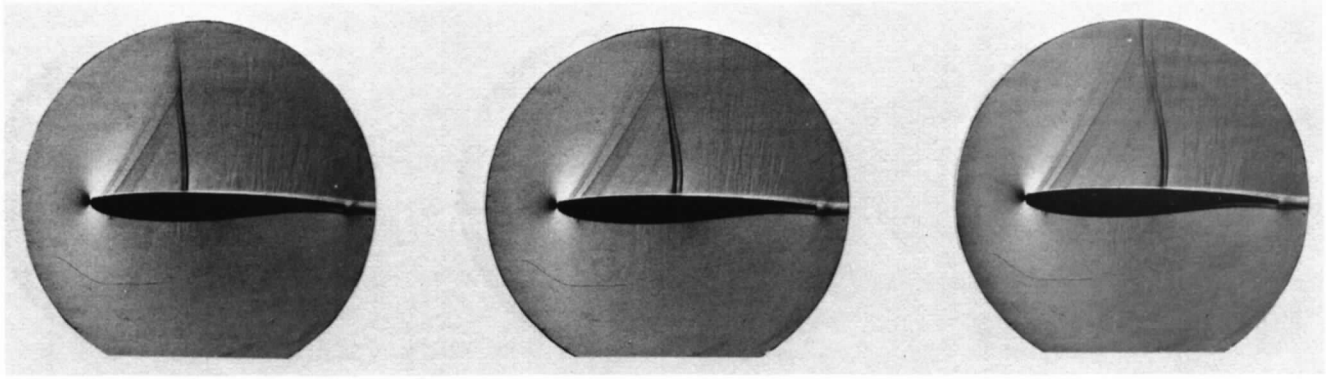


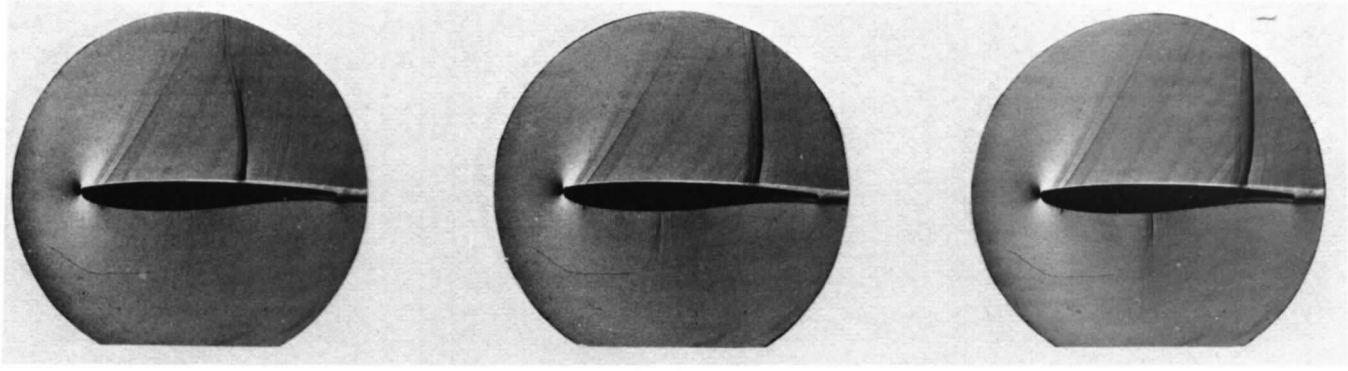
Fig 31 Forces on aerofoils 9515 and 9530



M_∞ = 0.75 0.76 0.77

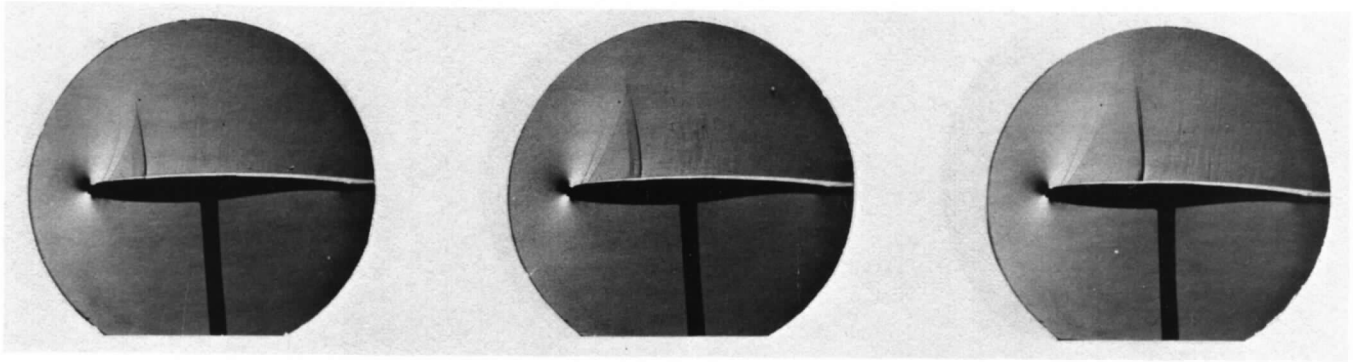


M_∞ = 0.775 0.78 (1) 0.785 (2)

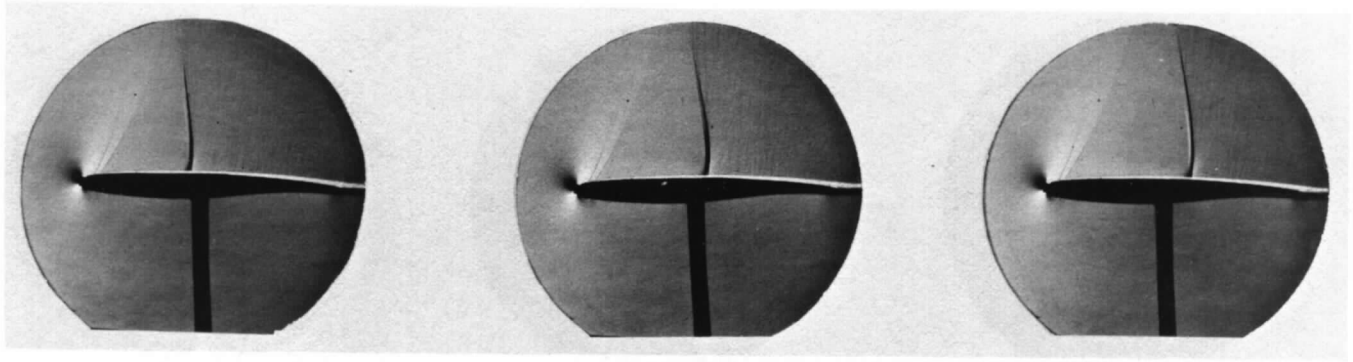


M_∞ = 0.79 (3) 0.80 (4) 0.81

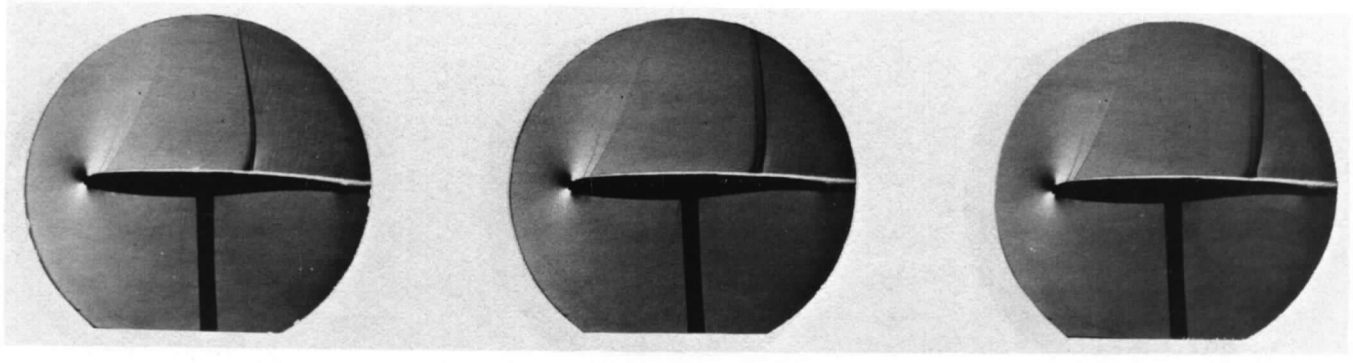
Fig.32 9515 — Schlieren photographs, $\alpha = 2^o$



M_∞ = 0.75 0.76 0.77



M_∞ = 0.775 0.78 0.785



M_∞ = 0.79 0.80 0.81

Fig.33 9530 — Schlieren photographs, α = 1.68°

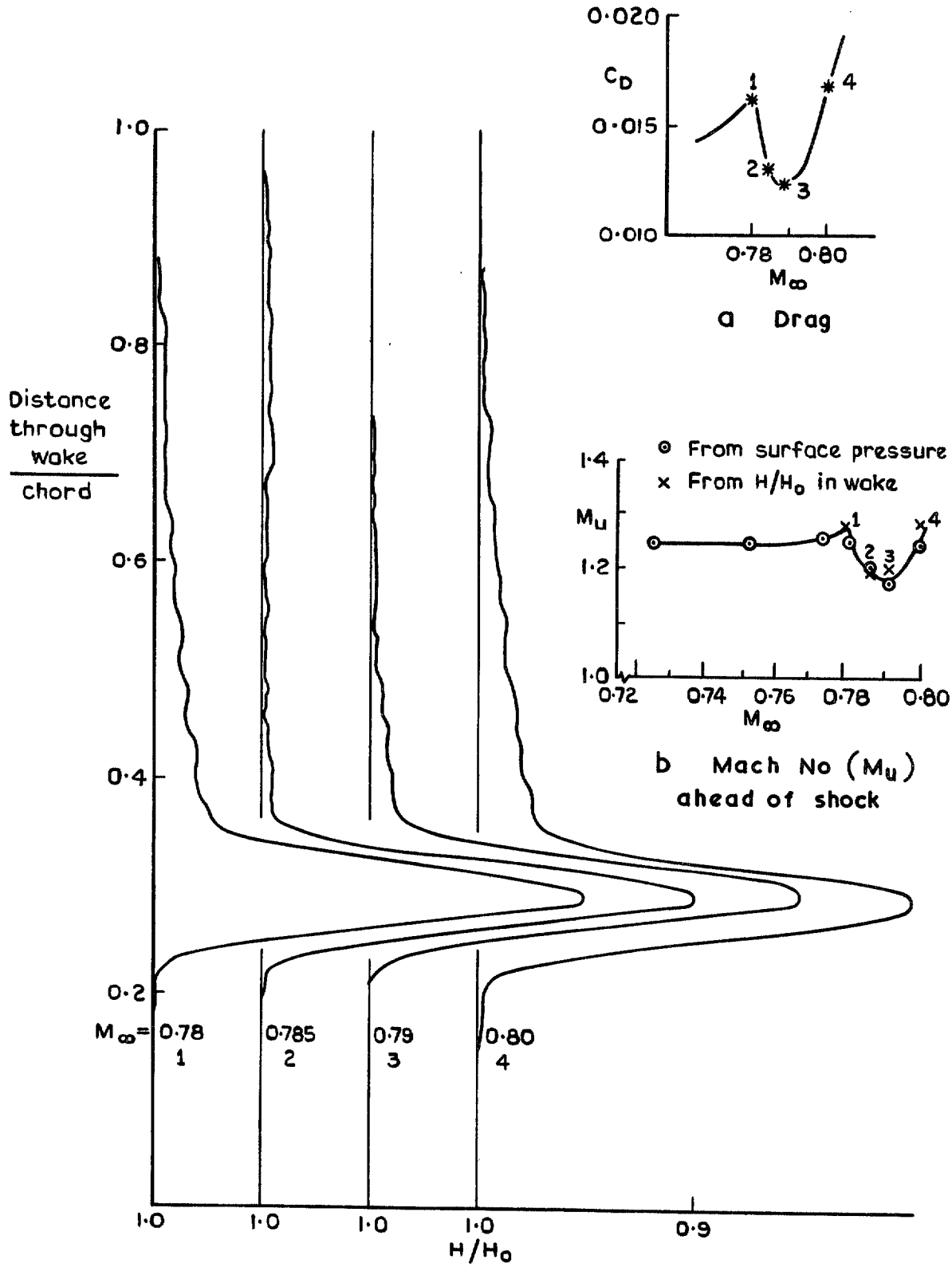


Fig 34 Variation of H/H_0 through the wake for 9515 $\alpha = 2°$

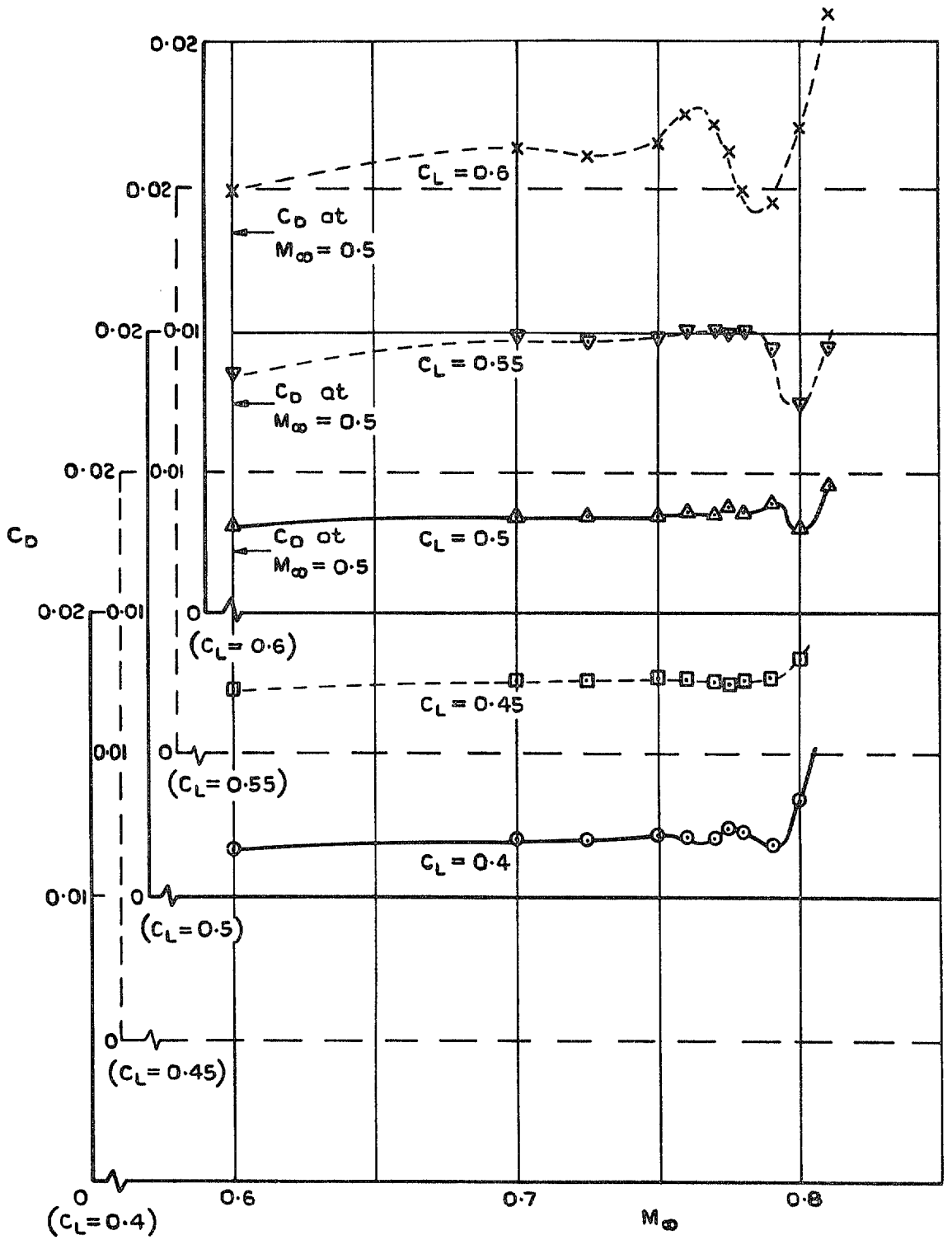


Fig 35 9515 — Drag at constant lift coefficient

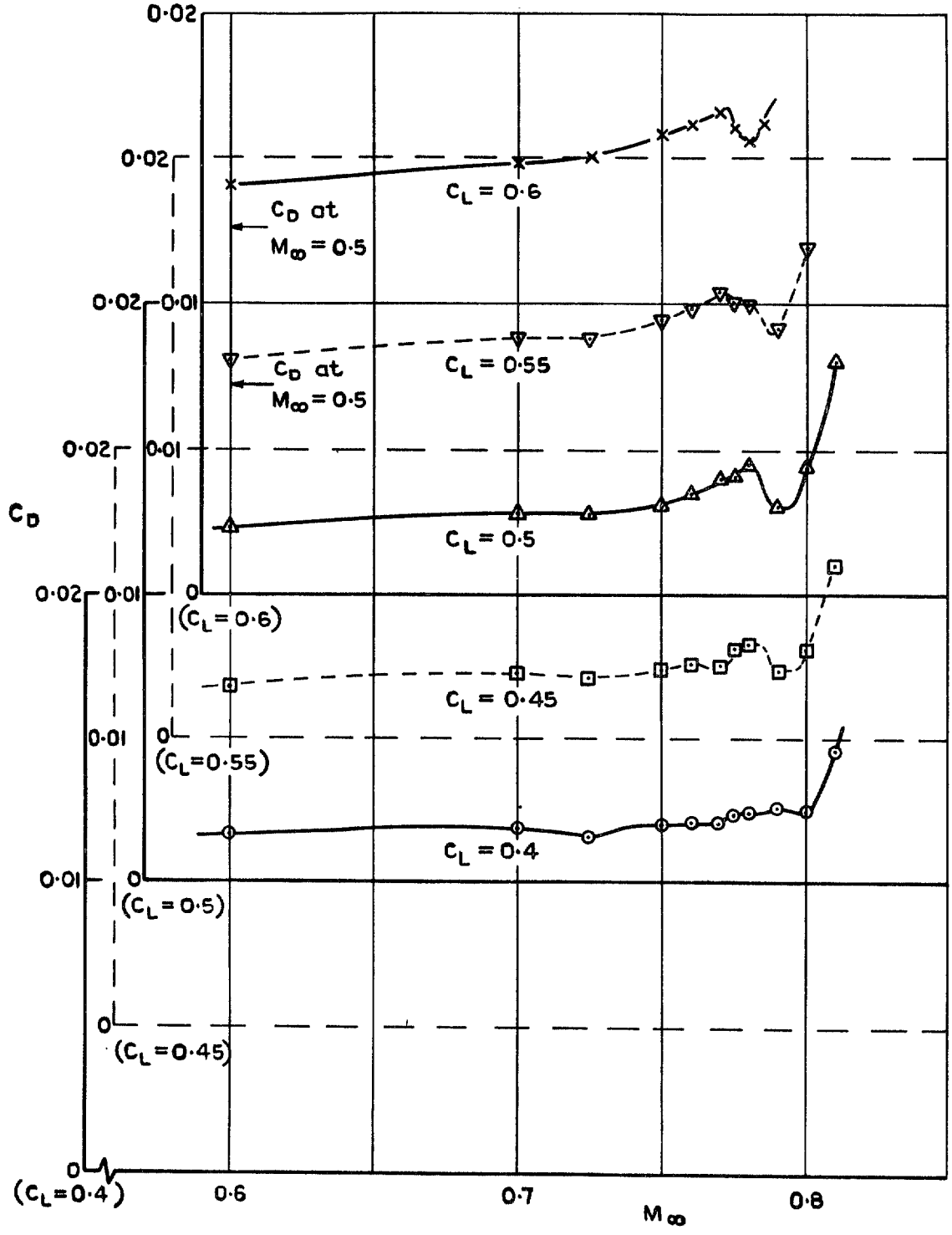


Fig 36 9530 — Drag at constant lift coefficient

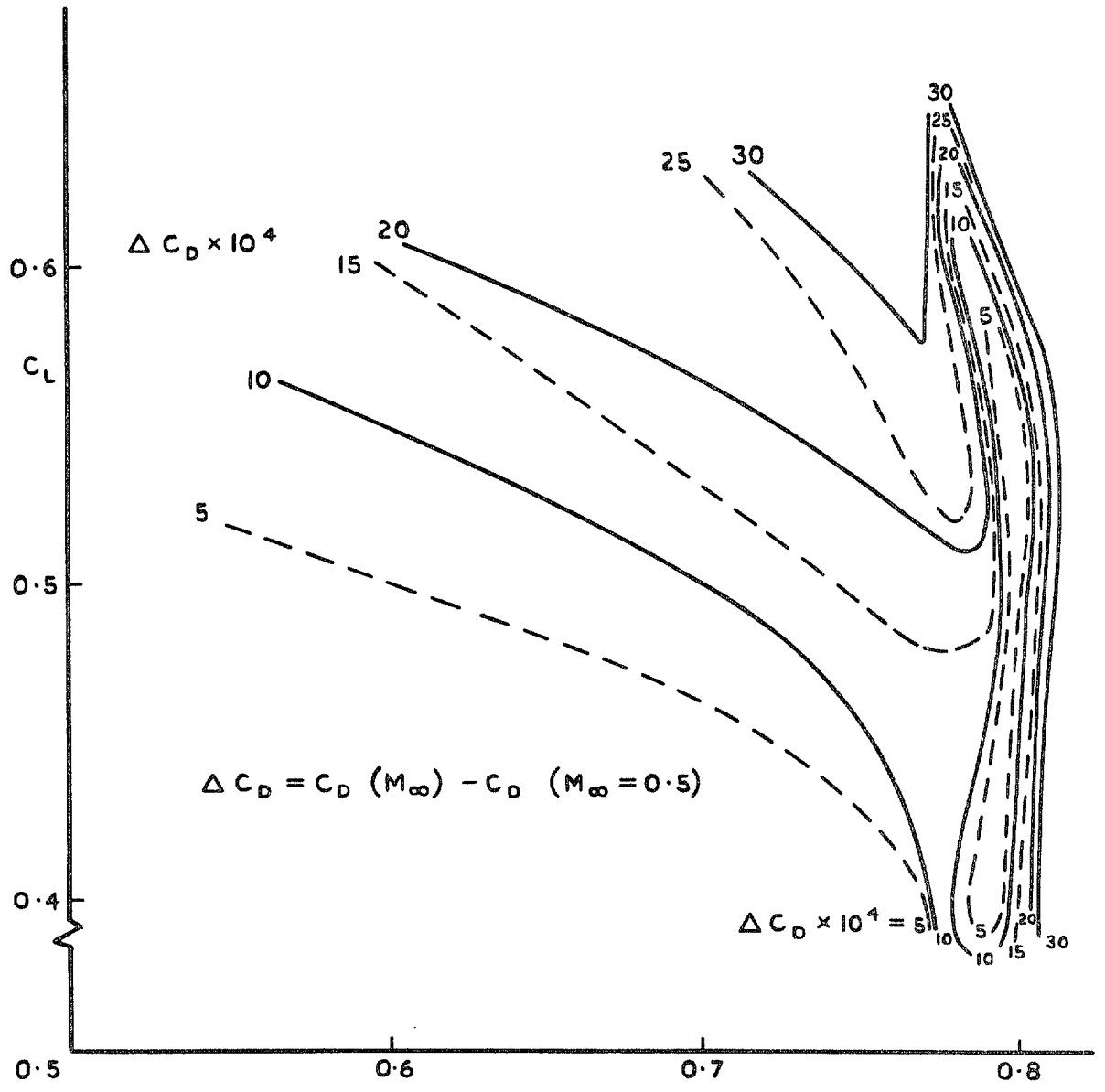


Fig 37 9515 — Contours of drag increment

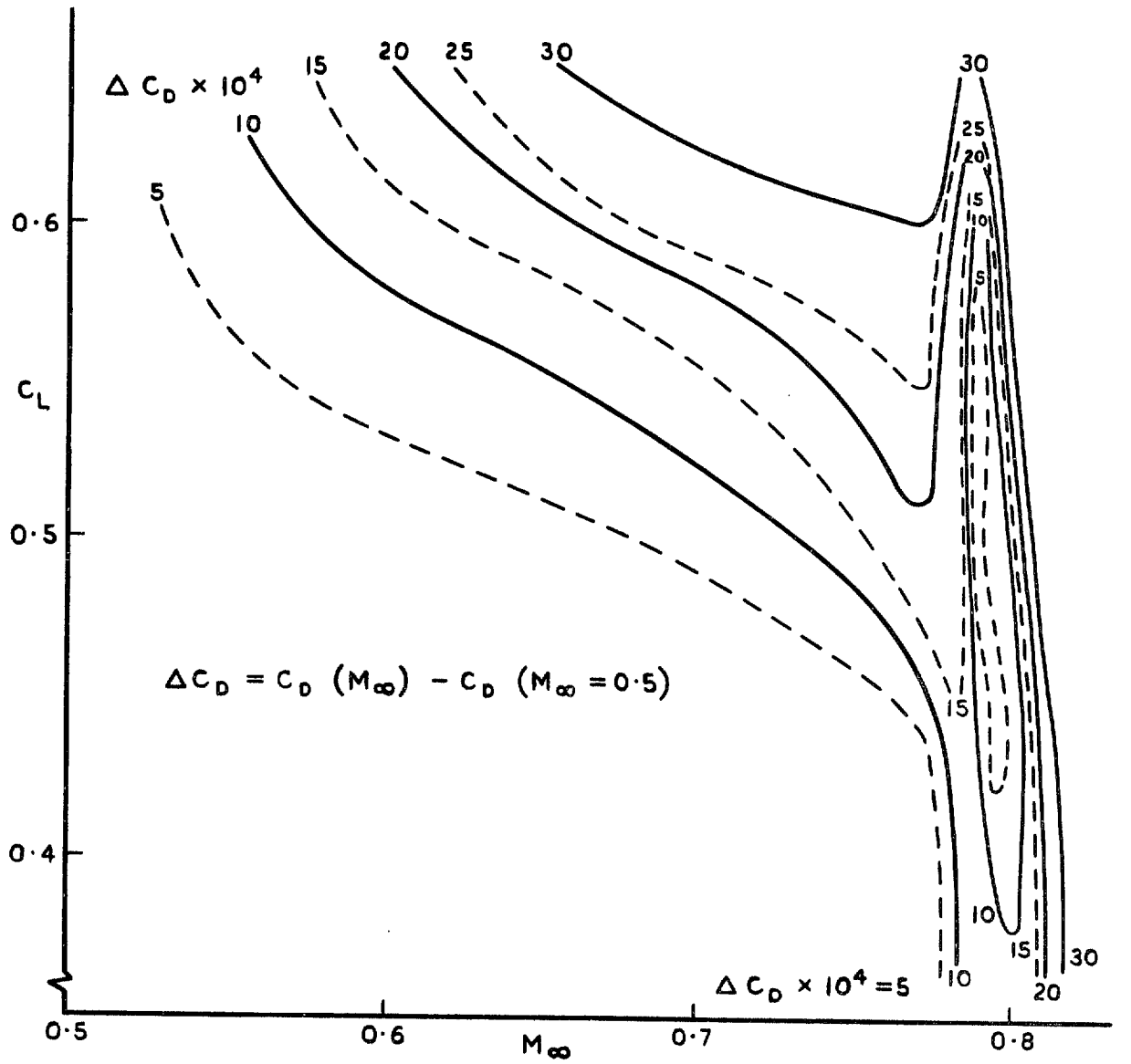


Fig 38 9530 — Contours of drag increment

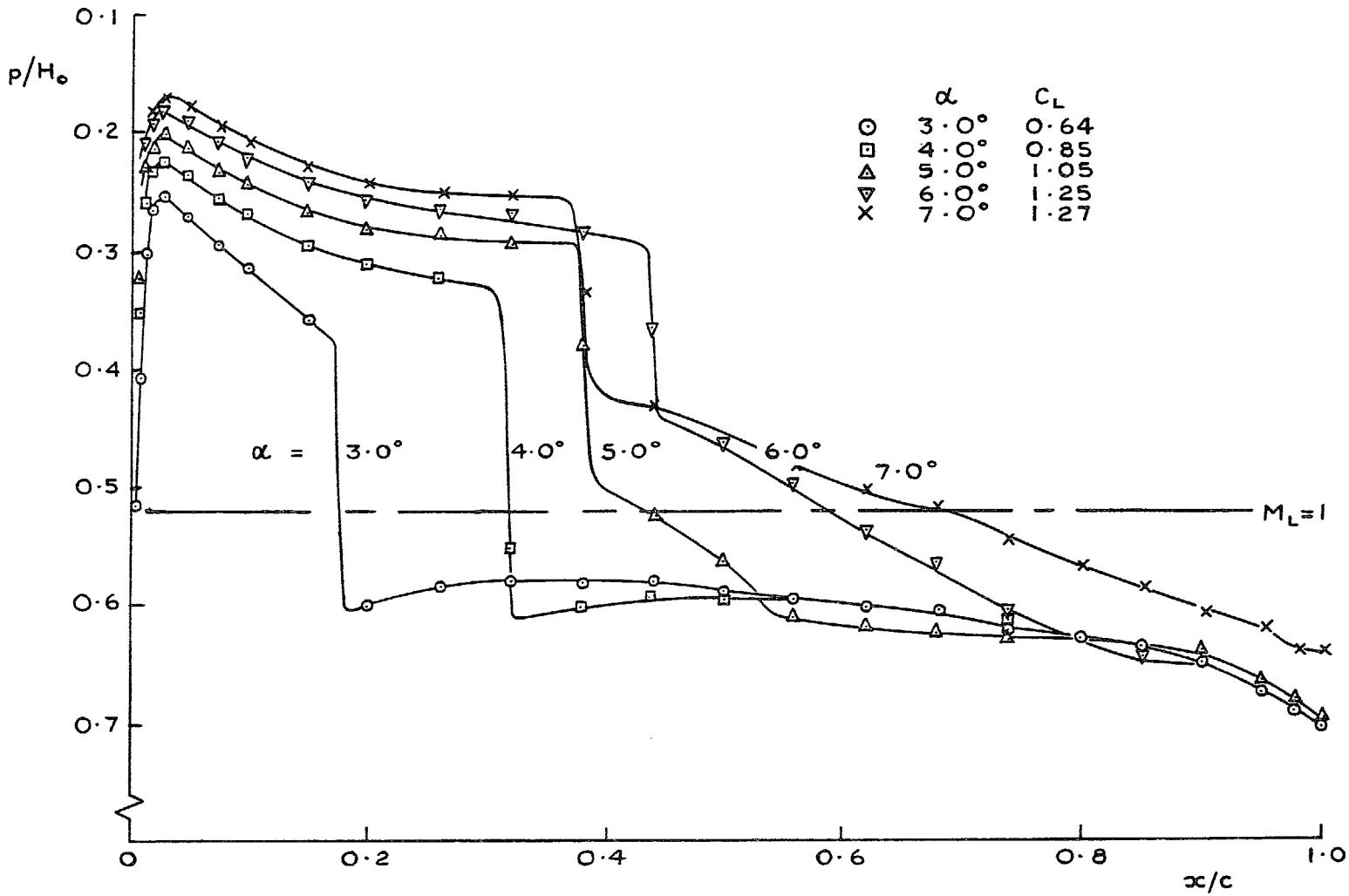


Fig 39 9515 — Upper surface pressure distributions M = 0.7

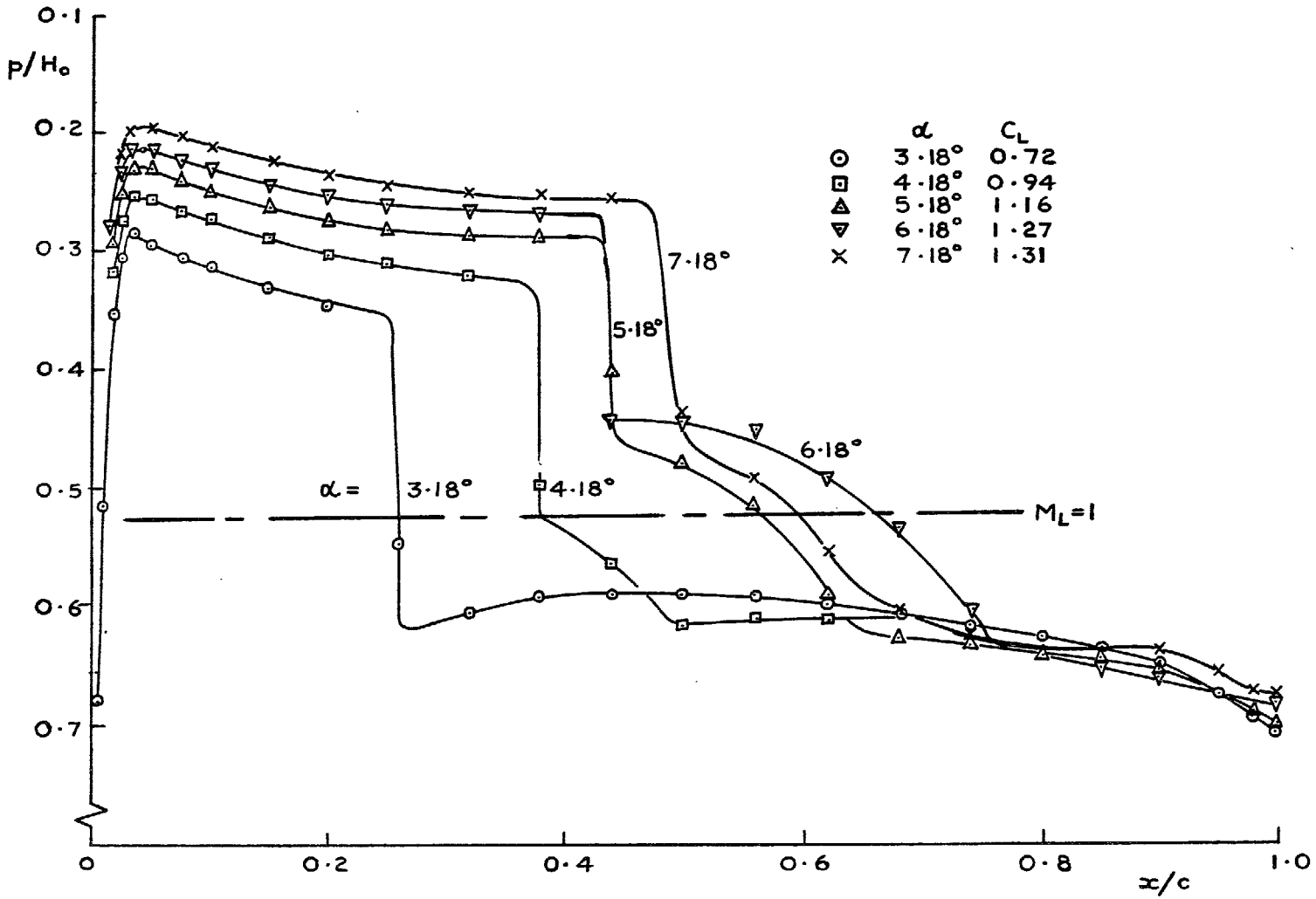


Fig 40 9530 — Upper surface pressure distributions $M_\infty = 0.7$

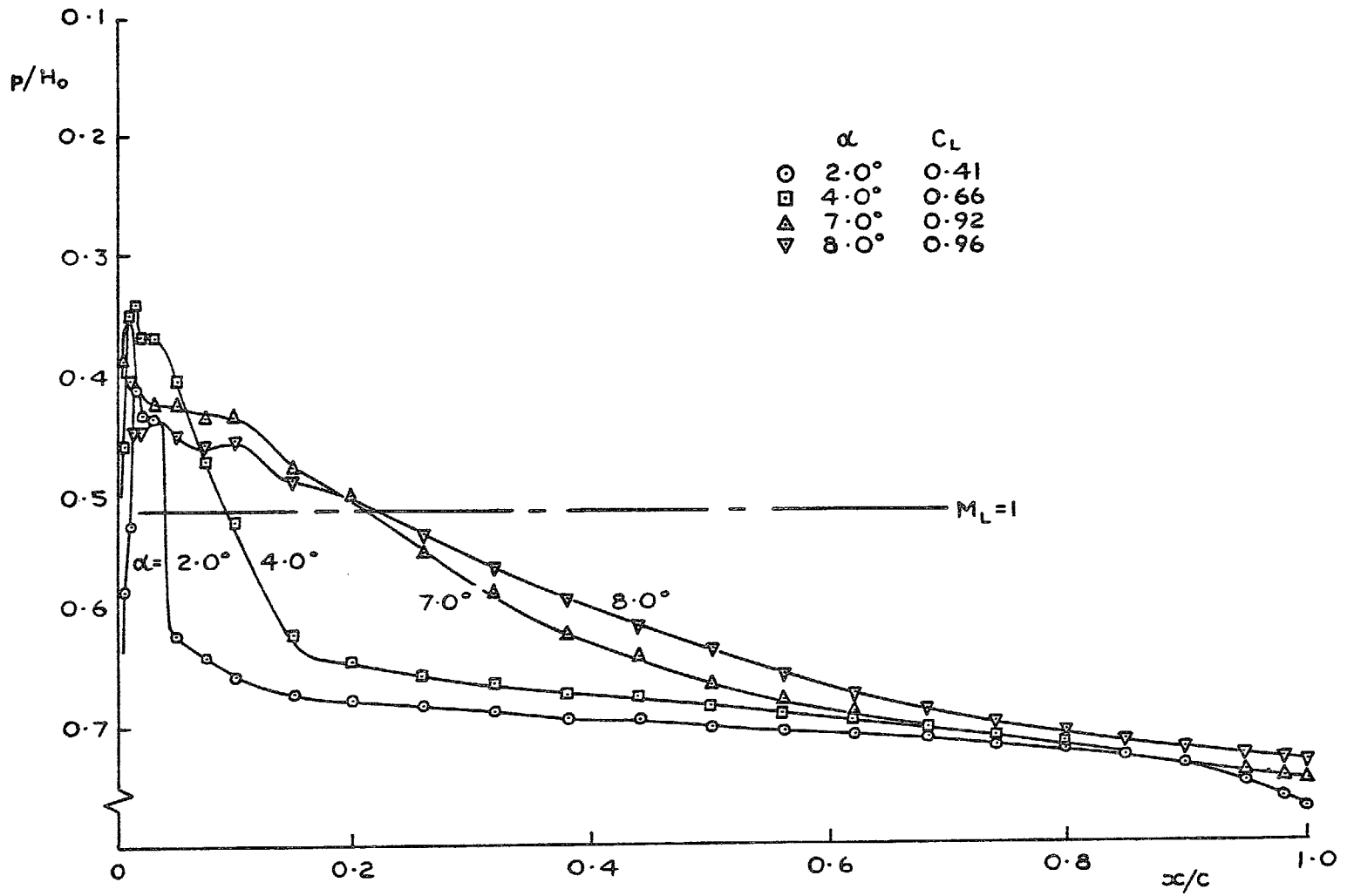


Fig 41 9515 — Upper surface pressure distributions M = 0.6

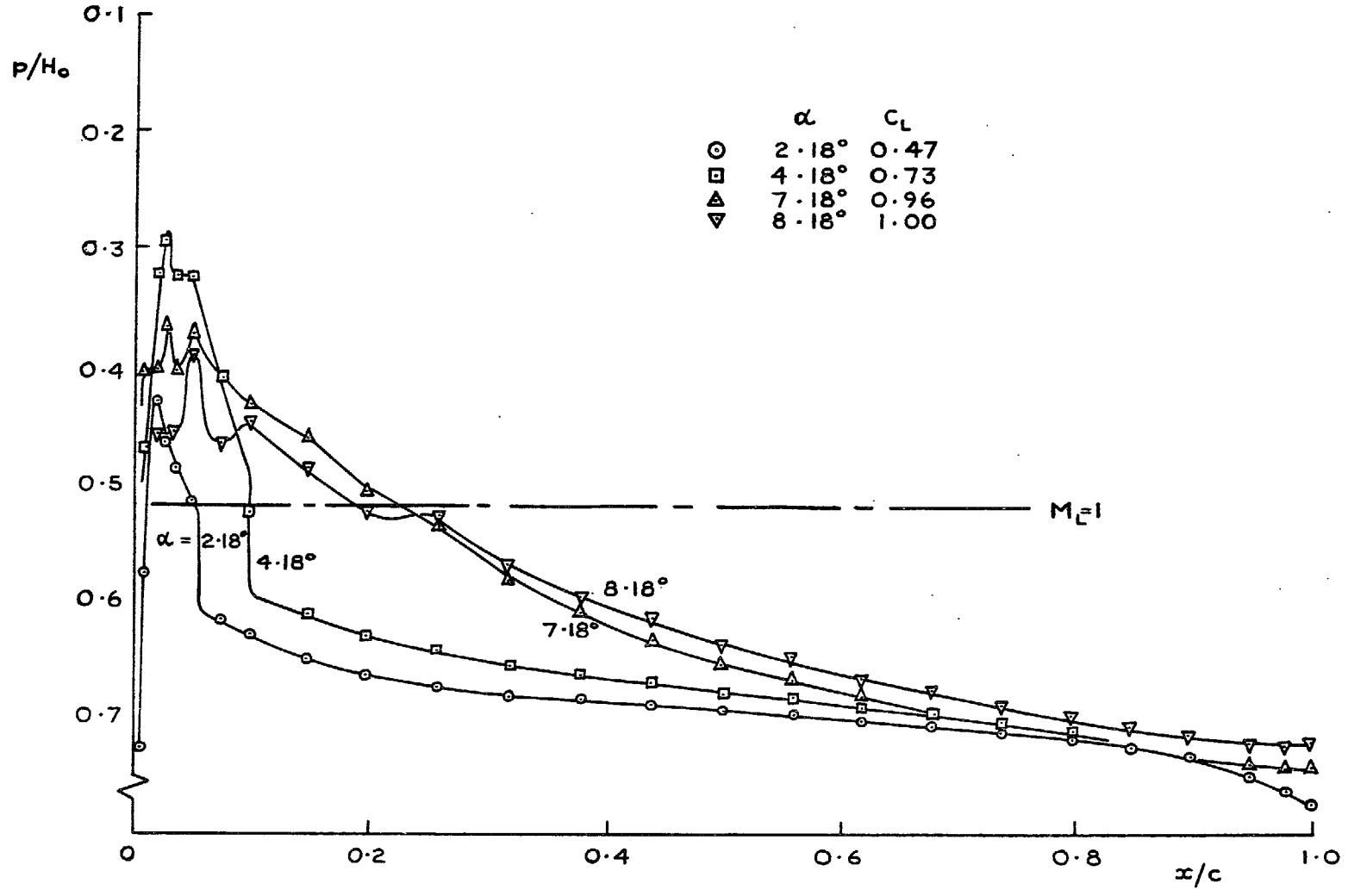


Fig 42 9530 — Upper surface pressure distributions M = 0.6

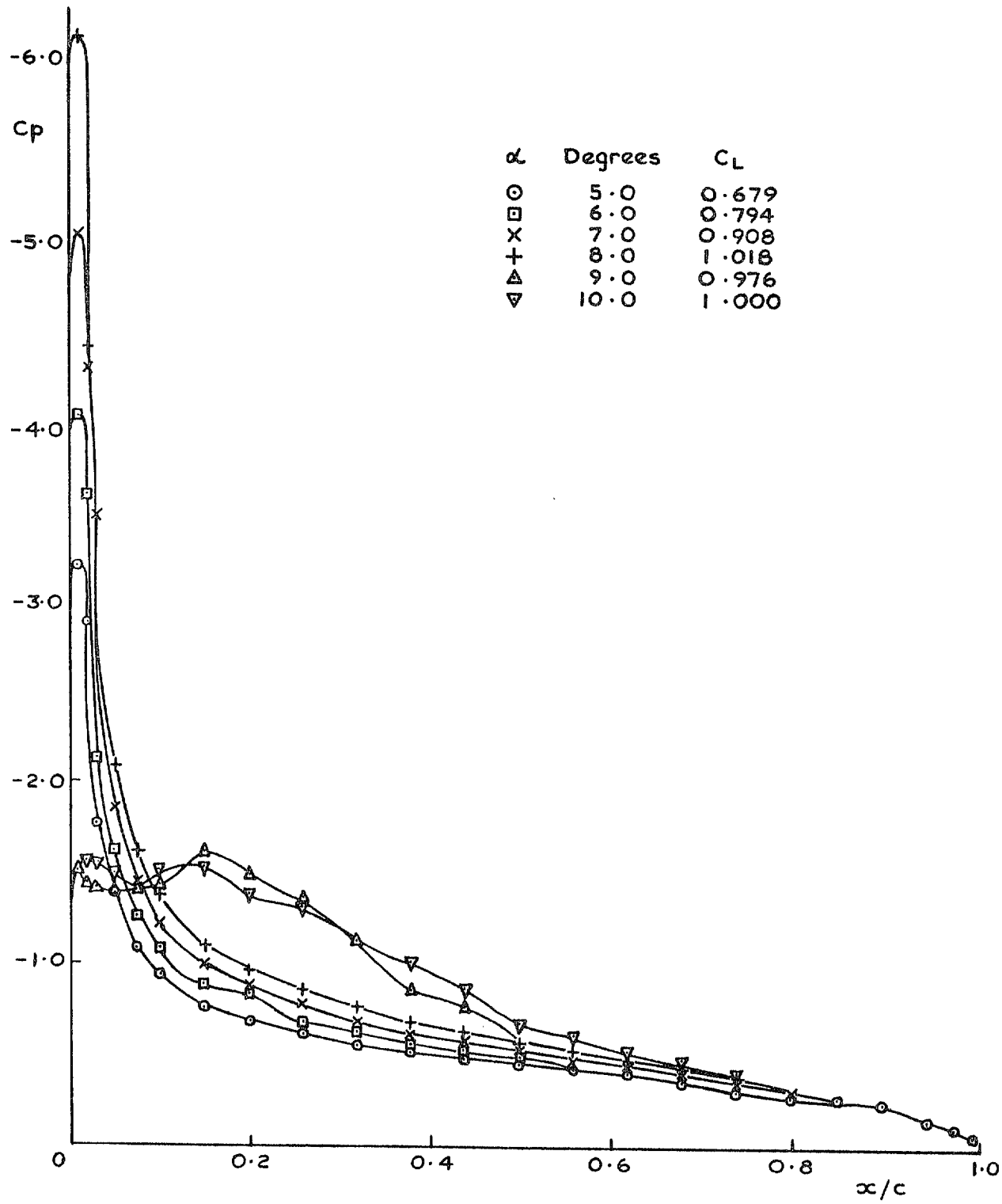


Fig 43 9515 – Upper surface pressure distributions M = 0.3

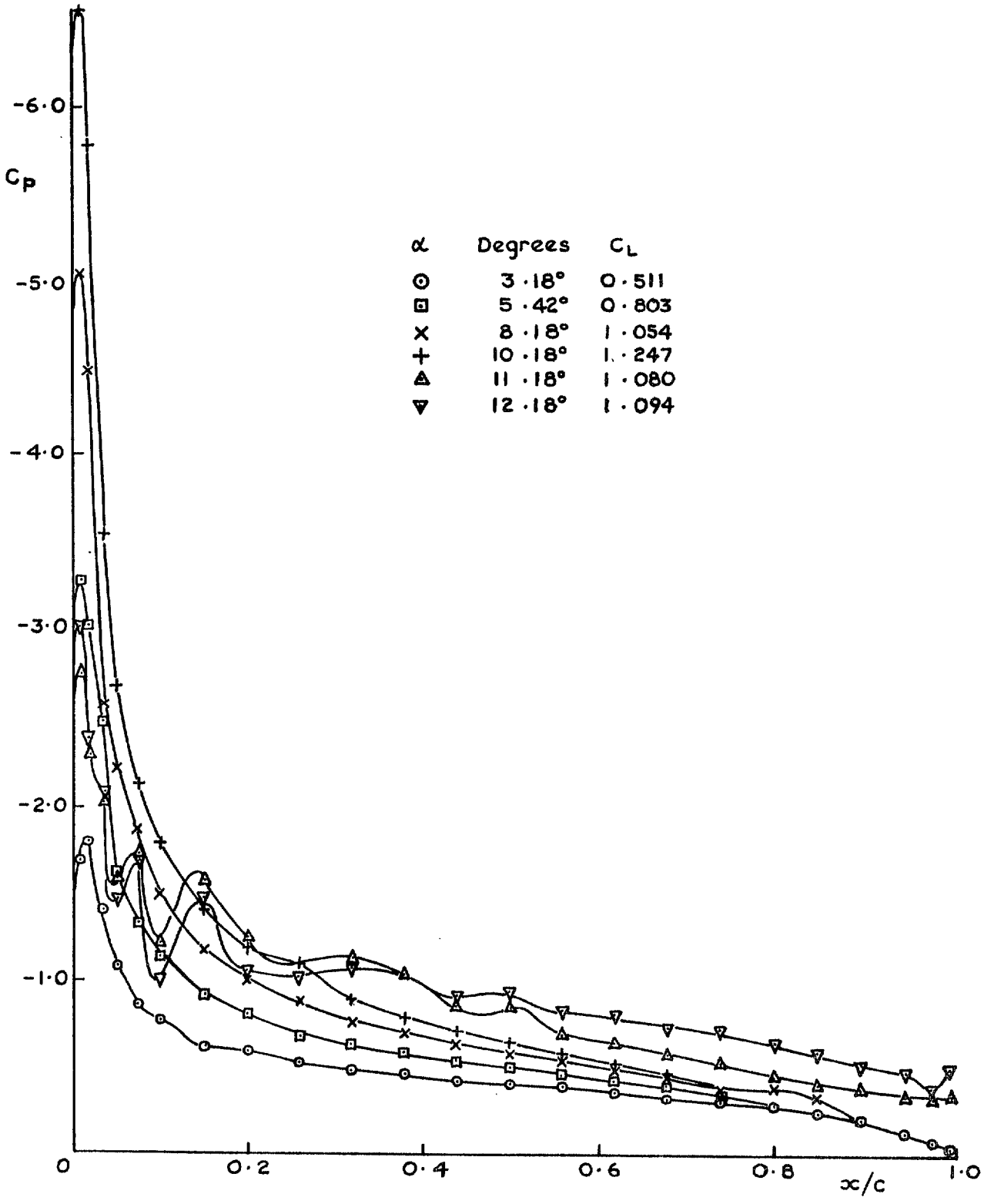


Fig 44 9530 — Upper surface pressure distributions M = 0.3

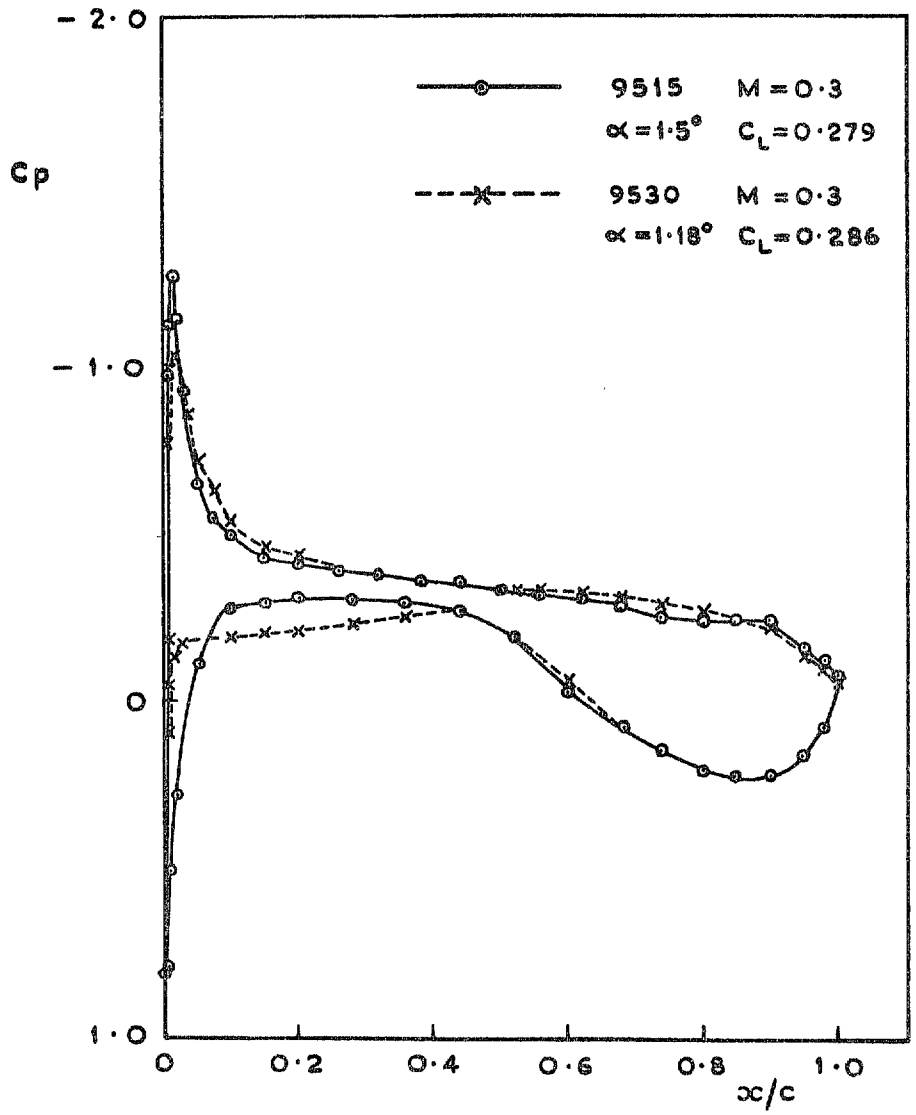


Fig 45 Comparison of pressure distributions at C_L = 0.28 M = 0.3

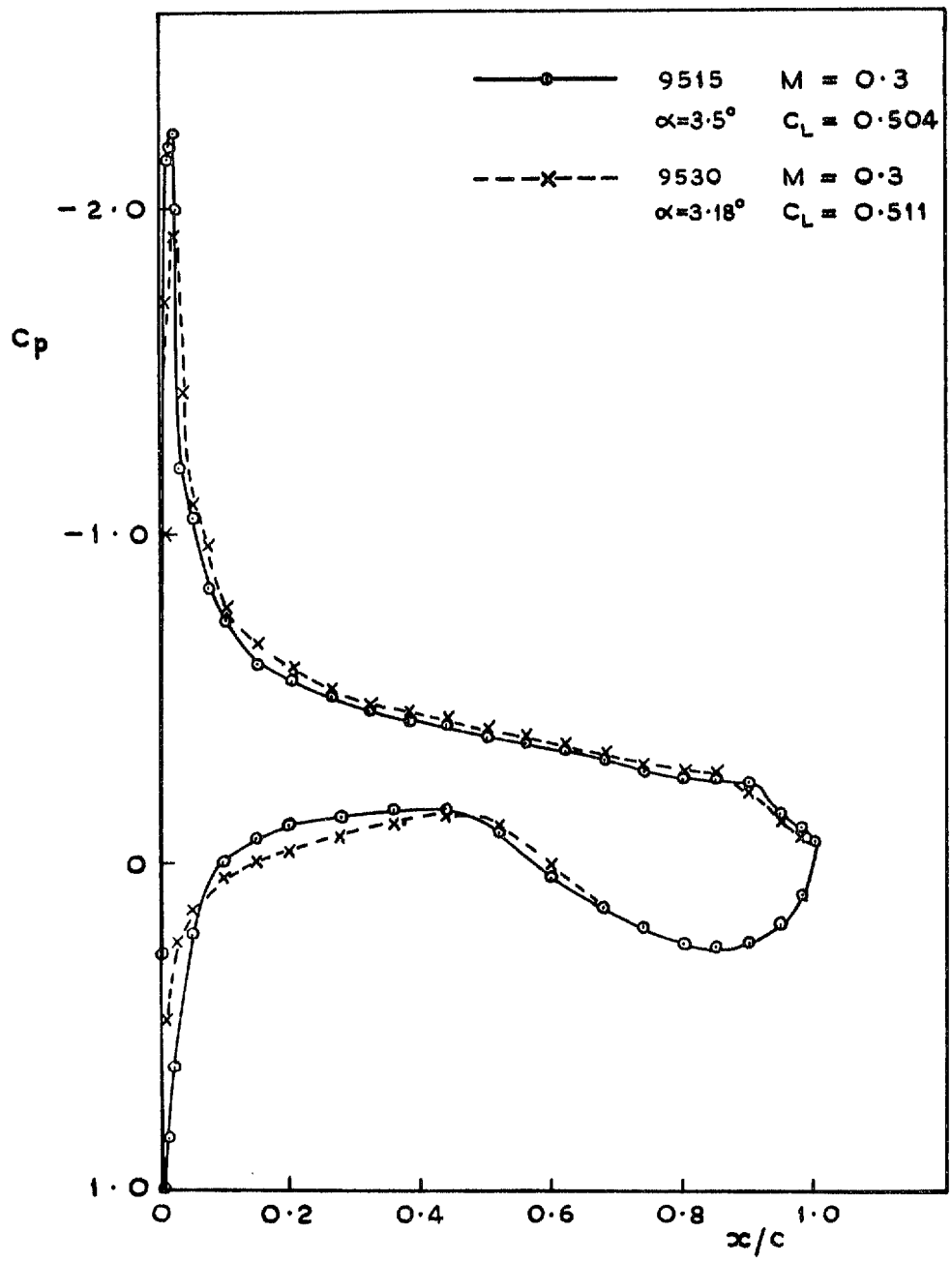


Fig 46 Comparison of pressure distributions at C_L = 0.51 M = 0.3

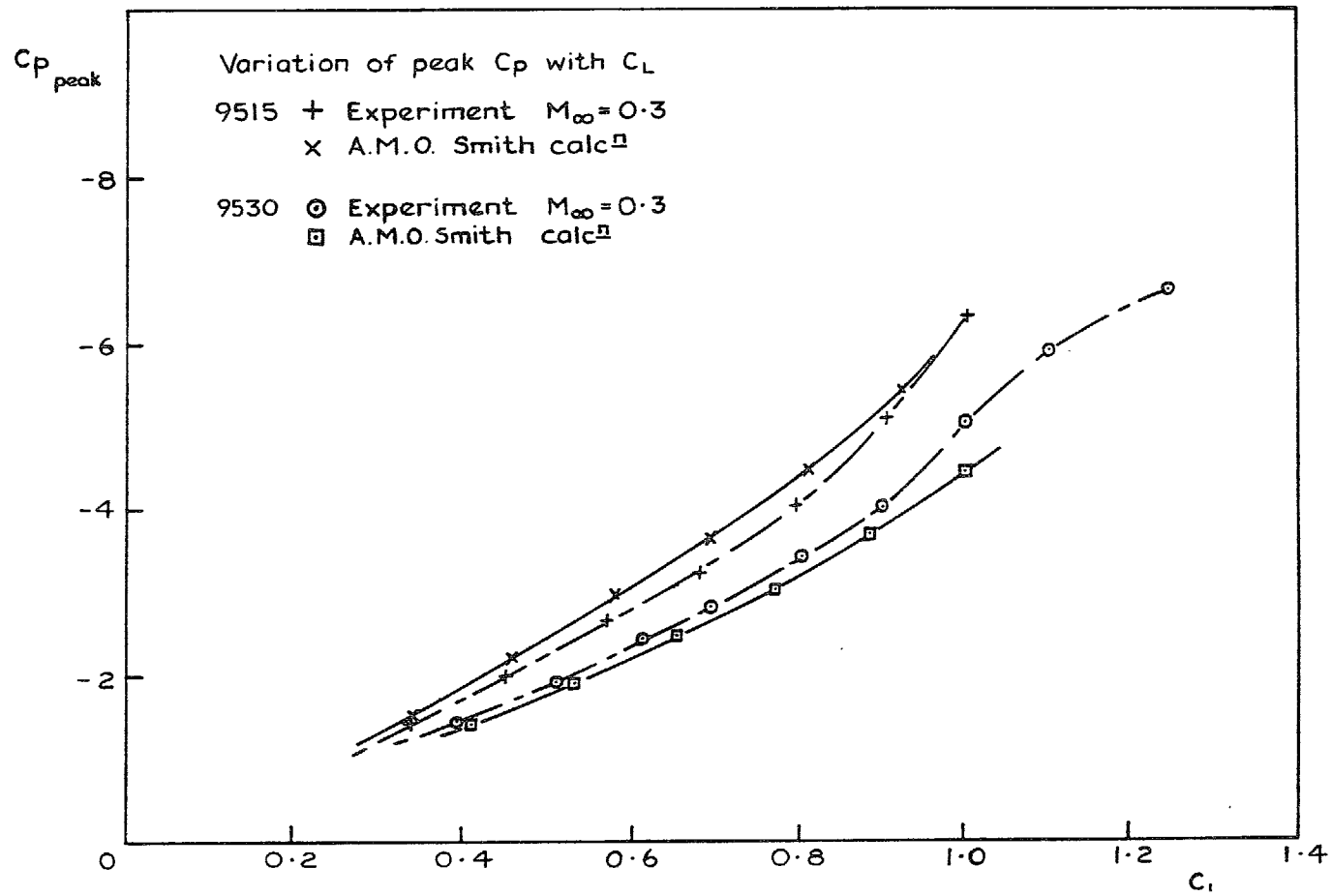


Fig 47 Variation of peak C_p with C_L

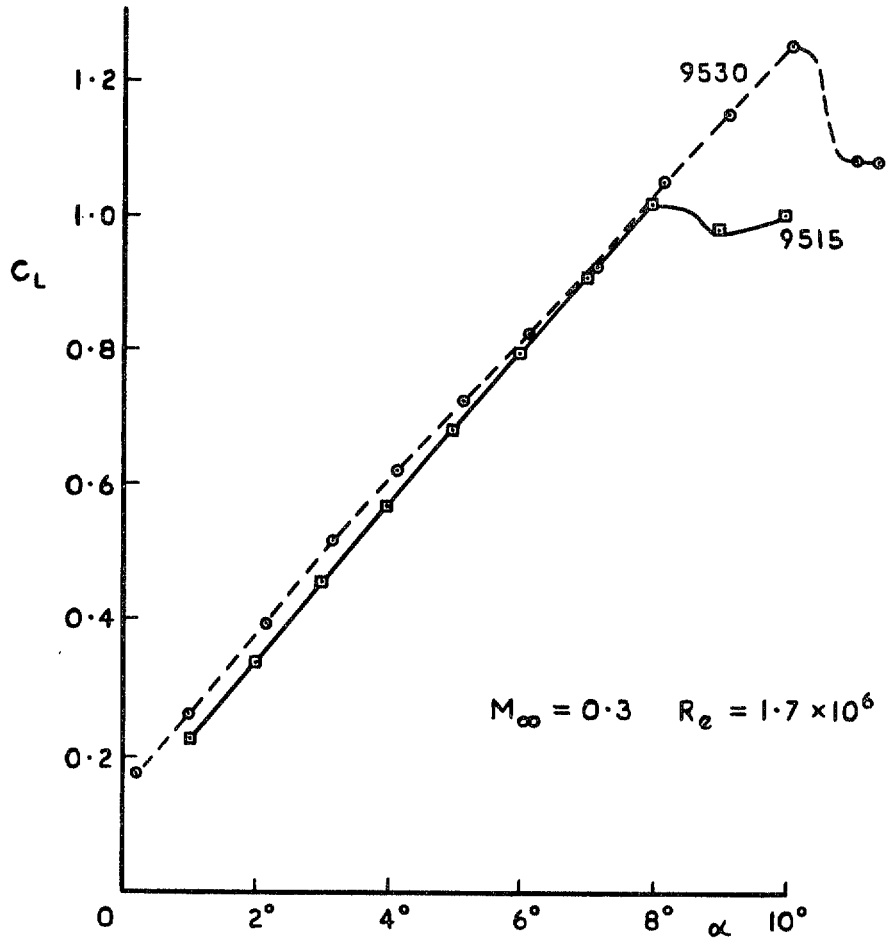


Fig 48 Low speed lift curves

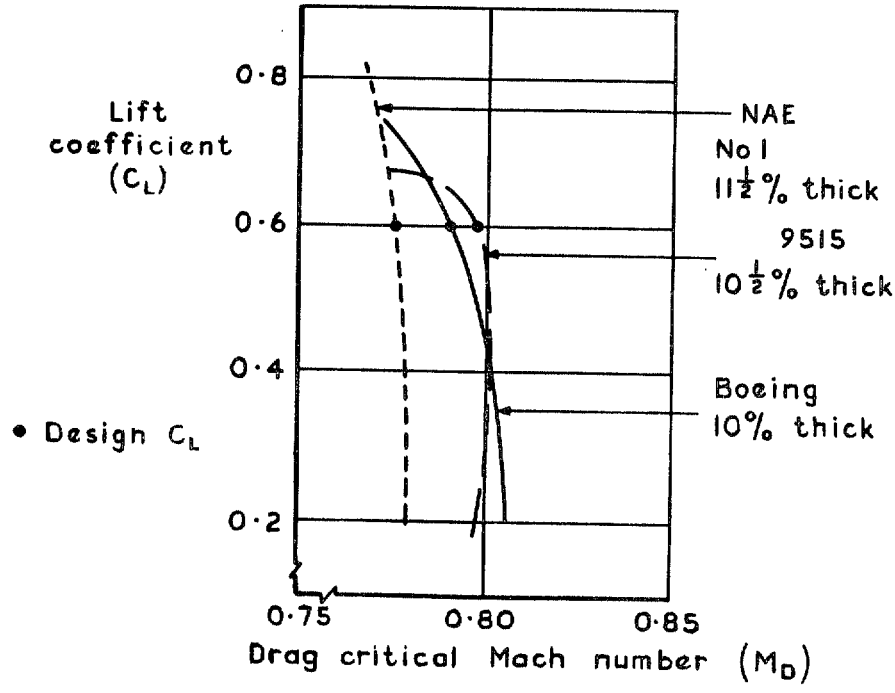
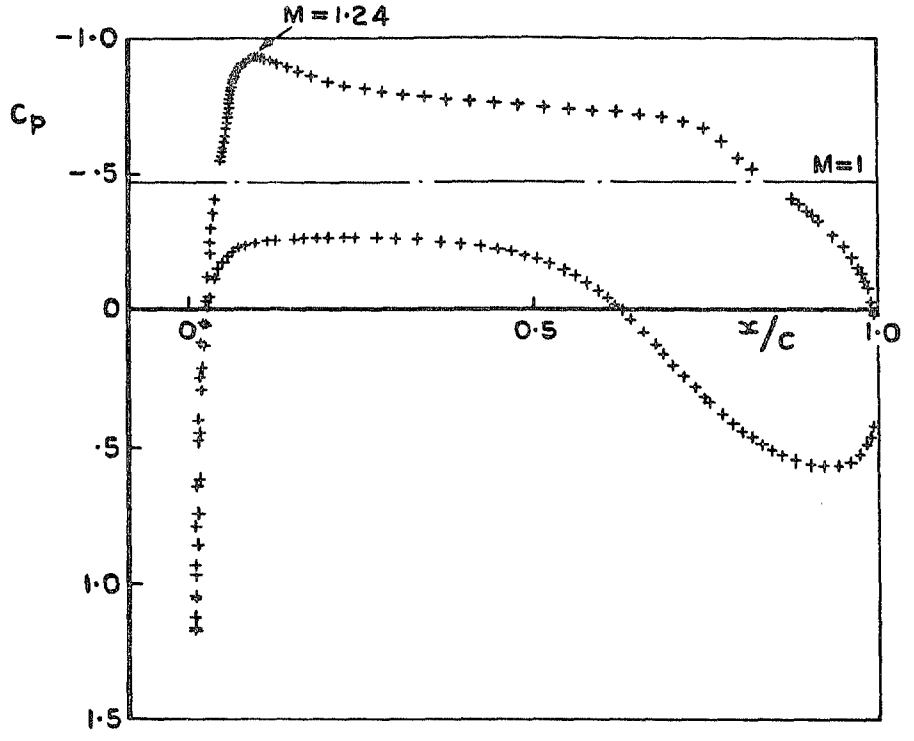
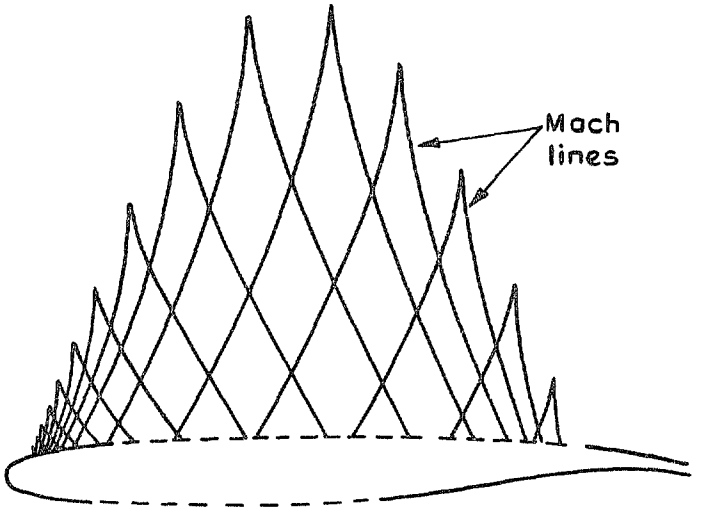


Fig 49 Drag divergence characteristics for various supercritical aerofoils





M=·790 CL=·677 CD=·0271 T/C=·105

Fig 50 Aerofoil designed by BGK method

*Part II

AERODYNAMIC DATA FOR RAE 9550, A SUPERCRITICAL AEROFOIL

SUMMARY

Aerodynamic characteristics are presented of a 12.2% thick supercritical aerofoil derived from an NLR shockless lifting aerofoil. The results cover the Mach number range 0.4 to 0.82 and angles of incidence from 1.0° to 11.0°; they show that the section can sustain supersonic flow over 60% of the upper surface chord, the supersonic region being terminated by a weak shock wave.

At the optimum conditions ($M_{\infty} = 0.76$, $C_L \doteq 0.4$) the section has an isentropic recompression on the upper surface, the drag-rise Mach number at this lift coefficient being about 0.77.

The results compare favourably with theory and with the limited published results for an aerofoil of a similar type.

---

* Replaces RAE Technical Report 75068 - ARC 36262

CONTENTS

1 INTRODUCTION

For several years a research programme has been in progress, first at NPL and later at RAE, on the development of 'supercritical' aerofoils for use at high subsonic speeds. These aerofoils have two main features: (a) on the upper surface, there is a relatively large extent of supersonic flow, starting near the leading edge with a peak Mach number in excess of 1.2, and terminating with a shock wave that is sufficiently weak to cause no appreciable increment in drag; (b) at the rear of the aerofoil, appreciable rear loading is introduced, mainly by modifications to the shape of the lower surface.

Results of experiments on earlier aerofoils in this series (NPL 9510, RAE(NPL) 9515 and 9530) are reported in Part I and in Ref.6. In all these an attempt had been made to exploit the concepts mentioned above as far as practically feasible, within the limitations imposed by the low Reynolds number of the experiments (about 3×10^6). Impressive results were obtained with regard to the drag-rise Mach number (about 0.79 at a lift coefficient of 0.6 for a section 10½% thick) but adequate margins between the optimum drag-rise condition and the onset of serious effects of shock-induced separation could only be obtained by incorporating a thick (2% chord) blunt base. Furthermore, the means used to design these aerofoils had been of necessity largely empirical, since adequate theoretical methods for the purpose were not then available. It was therefore thought desirable to include a further aerofoil in which features (a) and (b) mentioned above were still present, but to a less extreme extent. For this purpose a shock-free, lifting aerofoil, designed at NLR by the method of Nieuwland[1], was used as a starting point, and the shape of the lower surface ahead of the trailing edge was modified in such a way as to increase the rear loading. The resulting aerofoil, designated RAE 9550, is 12½% thick and has a small amount of base thickness (0.5% chord).

This Report gives the results of wind tunnel tests on RAE 9550. It is shown that this section gives a useful increase in drag-rise Mach number over a conventional section of similar thickness, and has shock-free flow on its upper surface in a region around its design condition.

The Report begins with an outline of the method by which the aerofoil was designed. Then follows a description of the experimental method, and a brief account of the test results. The main discussion is subdivided into two sections describing the flow development at high and low speeds. A final section

compares the results obtained with theoretical results and with experimental results for a similar aerofoil designed elsewhere.

2 DESIGN PRINCIPLES

At the time (1971) when this section was designed, the theoretical methods of Bauer, Garabedian and Korn[2] and of Krupp and Murman[3], for calculating the flow around sections with large regions of supersonic flow embedded in the stream around them, were not yet available. As an alternative to the empirical design methods used previously it was decided to use as a basis for a new section a 12.2% thick aerofoil designed by the method of Nieuwland[1], shown in Fig.1. This aerofoil had, theoretically, a shock-free upper-surface pressure distribution at a free stream Mach number (M_∞) of 0.756 and an angle of incidence (α) of 1.32°. However, the pressure distribution predicted by the exact method of Nieuwland gave an inviscid lift coefficient (C_L) of only 0.254 at this shock-free 'design' condition. It was therefore thought desirable to attempt to increase the useful C_L, while retaining the shock-free upper-surface pressure distribution at the 'design' condition, by modifying the shape of the lower surface ahead of the trailing edge in such a way as to add rear loading. A pressure distribution was calculated for the NLR aerofoil at its design condition by the RAE standard method[4] which is strictly applicable only to subcritical flow. It can be seen (Fig.1) that this method predicts the overall pressure distribution well except in the region of the upper-surface leading-edge peak. A version[5] of the subcritical method of Ref.4 which included second order terms was also used and this gave an improved prediction of the overall pressure distribution. In the light of previous experience (Part I and Ref.6), the lower surface aft of the maximum thickness point was modified by undercutting the lower surface ahead of the trailing edge, and blending smoothly into the original section near mid-chord. The result of this lower surface modification was that the final 20% of the chord of the new section was structurally weak, so some additional thickness was added to the upper surface over the final 25% chord; this resulted in a blunt base 0.5% chord thick. This blunt base was expected also to alleviate the adverse pressure gradient on the upper surface near the trailing edge.

The pressure distribution for the modified section as calculated by the second order method is also shown in Fig.1. The calculation was made for an angle of incidence which was reduced so as to keep the calculated height of the peak pressure coefficient the same as for the original section. It can be seen

that the differences in pressure distribution are confined to the aft half of the aerofoil.

A comparison of the shapes of the original NLR section and the new section, RAE 9550, is shown in Fig.2, and the ordinates for the new section are given in Table 1.

3 EXPERIMENTAL DETAILS

The aerodynamic data were obtained with a model of 0.25m chord spanning the 0.36m dimension of the NPL 36in × 14in (0.92m × 0.36m) transonic wind tunnel. The floor and ceiling of the tunnel were slotted (four slots, overall open-area ratio = 0.033) and were 0.79 m apart throughout the length of the working section. It has been shown by Osborne[7] that this configuration gives approximately blockage-free results on a NACA 0012 section at zero angle of incidence at Mach numbers up to 0.8. Thus no attempt has been made to apply blockage corrections to the results, nor have any corrections been applied for lift interference. This should not be taken to imply that these are not significant; on the contrary, it is probable that appreciable asymmetric interference effects will be present for aerofoils of this type, where large regions of supersonic flow occur in some cases extending almost to the tunnel wall from one surface.

The Reynolds number varies with free stream Mach number (M_∞), since the tunnel always operates with the stagnation pressure approximately atmospheric, the range of Reynolds number based on model chord being from 2.2×10^6 at $M_\infty = 0.4$ to 3.65×10^6 at $M_\infty = 0.82$. Transition bands of approximately 200 grade carborundum (i.e. particles of the order of 0.08 mm) were used on the models. The bands extended from 4% to 7% of chord on the upper and lower surfaces. By observing the flow by the direct shadow method it was noted that transition occurred between 0.10 and 0.30 chord downstream of the bands, usually ahead of 20% chord on the upper surface but sometimes back to 30% chord on the lower surface.

Pressures were measured at 50 static holes spread across the central 180 mm of the span of the model; lift and pitching moments were estimated from integration of the local pressures. Profile drag was obtained by wake traverse, using a single total head tube, at a distance of one chord length downstream of the trailing edge, which could be traversed through the wake in steps of constant size.

It has been established by Smith and Moreton[8] that it is possible to make pressure measurements in wind tunnels to an accuracy of 0.1% of full scale pressure using transducers with a specified non-linearity and hysteresis of 0.5% to 0.75% of full scale. The hysteresis is eliminated by subjecting the transducer to an intermediate (interport) vacuum between the pressures being measured. This ensures that the pressure is always measured relative to a pressure at one extreme of the transducer range. Non-linearity in the transducer calibration is accounted for in the data-reduction program, using an algebraic relationship between the transducer output and pressure. Brief checks on the transducer calibration were made at fixed points from day to day using set reference pressures, and minor adjustments to the system were made if required. The accuracy of the measured pressures are therefore of the order of ± 0.0004 in P/H_0.

4 TEST RESULTS

The model was tested over a range of angle of incidence (α) from $\alpha = 1.0^\circ$ to $\alpha = 11^\circ$ with a range of free stream Mach number from $M_\infty = 0.4$ to $M_\infty = 0.82$. Table 2 contains complete sets of data for 9550 at all the conditions of Mach number and angle of incidence tested, but only results relevant to the discussion of the performance of the section have been plotted. Definitions of the quantities given in these tables are shown in the list of symbols.

The variation in lift coefficient with Mach number and angle of incidence is shown in Fig.3. Throughout the Mach number range tested the stall is gentle except at Mach numbers near $M_\infty = 0.7$ where a more abrupt lift-break occurs Fig.4 shows the variation of lift coefficient with Mach number at constant angles of incidence. It can be seen that for angles of incidence up to 6° the lift coefficient increases steadily with increasing free stream Mach number to a maximum at about the Mach number at which rapid drag rise occurs (*cf.* Fig.5).

Fig.5 shows the variation of drag coefficient with Mach number. At low angles of incidence the curves are of the usual shape with a slight drag 'creep' between $M_\infty = 0.7$ and the subsequent rapid drag rise near $M_\infty = 0.77$. [The value of C_D at $M_\infty = 0.77$, $\alpha = 2.0^\circ$ is suspect, since it is lower than the value at $M_\infty = 0.77$, $\alpha = 1.75^\circ$. It is difficult to accept this, since the shock strength on the upper surface at $\alpha = 1.75^\circ$ appears to be less than that at $\alpha = 2^\circ$ both from the pressure distributions and from the Schlieren

photographs.] At higher angles of incidence the drag creeps continuously upwards, there being no well defined subcritical drag level or rapid drag rise.

In Fig.6 curves are plotted of the variation of C_D with M_∞ at constant values of C_L between 0.2 and 0.6, obtained by interpolation from the measurements shown in Figs.4 and 5. In this form the apparent rate of drag increase with Mach number is reduced (compared with its variation at constant angle of incidence; see Fig.5), because, as Mach number increases, a given value of C_L is achieved at a progessively lower value of α (see Fig.4), so long as appreciable effects of boundary-layer separation are not present. From Figs.3, 4 and 6, Fig.7 has been constructed which shows the drag rise and separation boundaries for the section. The drag rise is defined here as the condition when C_D has reached a value 0.002 above its value at $M_\infty = 0.6$ for the same lift coefficient. Two curves are shown here for the separation boundary. The first is defined as the locus of points corresponding to

(a) for $M_\infty \geqslant 0.65$, the maximum value of C_L at constant α (see Fig.4)

and (b) for $M_\infty < 0.65$, the 'break' in the lift curve at constant M_∞ (see Fig.3).

[For $M_\infty \geqslant 0.65$ these definitions are in reasonable agreement: compare Figs.3 and 4.]

The second curve is defined as the locus of points corresponding to $C_{PTE} = 0$ (see Figs.10, 12, 14, 16, 19, 20, 21 and 22); since the trailing edge pressure coefficient for attached flow on this aerofoil is just positive (about 0.05), the value zero should correspond to the onset of appreciable trailing edge separation. As can be seen from Fig.7, these two curves do not differ significantly; although in fact the first criterion (based on C_L variation) gives a slightly more optimistic result for Mach numbers below 0.7 than the second (based on C_{PTE} divergence), the position being reversed at higher Mach numbers. It is noticeable that there is a good margin between drag rise and the onset of separation, of the order of 0.05 in Mach number at $C_L = 0.2$ decreasing to 0.02 in Mach number at $C_L = 0.5$. At low Mach numbers ($M_\infty = 0.4$) a C_L of about 1.0 is obtained before appreciable effects of the leading edge separation are felt.

The variation in pitching moment with C_L and M_∞ is shown in Fig.8; a characteristic increase in nose-down pitching moment occurs as the supersonic region on the upper surface spreads downstream of the quarter chord point (the pitching axis). Since the supersonic region is terminated by a shock wave, at

most Mach numbers, the development of this region is indicated by the variation in position of the principal upper surface shock, shown in Fig.9, and variations in pitching moment can conveniently be discussed in terms of movements of this shock. Although the shock moves rapidly rearwards once a free stream Mach number of 0.70 is reached, it does not travel far past the 60% chord point and thus there is no large transfer of load to the rear of the pitching axis, and therefore the increases in nose-down pitching moment are not as large as for some more extreme aerofoils of this class (*cf.* Part I).

Figs.10 to 17 show typical pressure distributions for the section together with the associated Schlieren photographs. The significance of these is discussed in the following sections.

5 GENERAL DISCUSSION

In this section the development of the flow over the aerofoil is examined in detail for the full range of free stream Mach number and angle of incidence, particularly in respect of those aspects which are relevant to the more interesting features of the aerofoil performance. It is convenient to separate the flow development into two Mach number ranges: high, above $M_\infty = 0.70$ and low, below $M_\infty = 0.70$, for ease of discussion.

5.1 Flow development at high speed ($M_\infty > 0.70$)

At Mach numbers above 0.70, RAE 9550 demonstrates its ability to sustain supersonic flow over a large portion of the upper surface, up to 65% of chord at some conditions, the shock wave remaining weak over a considerable range of Mach number and angle of incidence. Figs.10 and 11 show the development of the pressure distributions and flow over the section at an angle of incidence $\alpha = 1.5^\circ$. The leading edge suction peak on the upper surface grows continuously until a free stream Mach number of about 0.76 is reached, when the peak height 'freezes' with the local Mach number at about 1.20. The suction peak is followed by an isentropic recompression for free stream Mach numbers up to about 0.76 (there being no evidence of shock waves on the Schlieren photographs until a Mach number of 0.77 is reached). At $M_\infty = 0.76$ the isentropic recompression extends from the leading edge peak to about 55% chord, but once this free stream Mach number has been passed ($M_\infty = 0.77$) the flow no longer recompresses following the leading edge peak and the local Mach number drops only slightly to a value of 1.15 just ahead of the shock, which forms at $x/c = 0.55$.

From the Schlieren photograph in Fig.11 it can be seen that the shock at $M_\infty = 0.77$ dies away rapidly as the distance from the surface increases. At Mach numbers greater than $M_\infty = 0.77$ the upper surface flow continues to expand slightly following the leading edge peak until at $M_\infty = 0.8$ the local Mach number ahead of the shock reaches 1.3. It can be seen from Figs.10 and 11 that as this happens the strength and extent of the shock increases dramatically. The inset in Fig.10 shows the variation of C_{PTE} with M_∞ and thus indicates the onset of trailing edge separation. It shows that the first effect of separation is felt at $M_\infty = 0.795$. It is at this angle of incidence that the upper surface pressure distribution on this section corresponds most closely with that of the original NLR section (see later). The lower surface pressure distributions at these Mach numbers show the extensive amount of lift carried over the rear 40% of the aerofoil due to the high pressures on the lower surface. It can be seen that the effect of increasing free stream Mach number is to increase the local Mach number over the whole lower surface by a similar amount, and this gives rise to an embryonic shock at the lower surface 'crest' at $M_\infty = 0.76$ (see Fig.11). The strength of this shock at the surface increases rapidly until at $M_\infty = 0.8$ it is at least as strong as the upper surface shock; however as can be seen in Fig.11 the strength of shock decreases rapidly away from the surface. The strength of this lower surface shock is sufficient at this stage to add appreciably to the overall drag.

Figs.12 and 13 show the development of the pressure distributions and flow over the section at $\alpha = 1.75^\circ$; this can be considered as the 'optimum' angle of incidence for this section (optimum in the sense that shock-free flow is obtained at an appropriate Mach number with a viscous section C_L double that of the original NLR section). It can be seen that the effect of increasing the angle of incidence is to increase the peak height (the peak local Mach number is now 1.22); however the leading edge peak is now followed, for M_∞ between 0.72 and 0.75, by a weak shock wave as can be seen in Fig.13. At $M_\infty = 0.76$ this shock wave almost disappears and the upper surface becomes essentially shock-free with $C_L = 0.408$. Following this optimum condition the shock reappears further back along the chord and rapidly increases in strength with increasing Mach number, eventually giving rise to trailing-edge separation at $M_\infty = 0.79$, as indicated by the inset showing the variation of C_{PTE} with M_∞ . On the lower surface, when the shock wave forms, it is weaker due to the increase in the angle of incidence, and thus the flow over the section is progressively becoming dominated by conditions on the upper surface.

Figs.14 to 17 show the pressure distributions and flow over the aerofoil at angles of incidence higher than the optimum. It can be seen that the peak height increases progressively and thus the aerofoil can no longer recompress the supersonic flow by an isentropic compression as was possible at the optimum angle of incidence. Meanwhile the lower surface shock forms at progressively higher free stream Mach numbers, and thus for a given Mach number its strength decreases as the angle of incidence increases.

Fig.18 compares the original theoretical NLR upper-surface pressure distribution with some of the upper-surface pressure distributions obtained experimentally for RAE 9550. It can be seen that the results for $\alpha = 1.5^{\circ}$ and $M_{\infty} = 0.75$ and 0.76 agree roughly with the original distribution over most of the upper-surface, except for x/c greater than 0.75, where viscous effects are beginning to make themselves felt and the surface shape has been modified slightly. At $\alpha = 1.75^{\circ}$ and $M_{\infty} = 0.75$ and 0.76 the upper-surface pressure distribution is still shock-free and still in reasonable agreement with the NLR theory. Except for the trailing edge region the only other region of discrepancy appears to be in the vicinity of the leading edge suction peak, where the results for RAE 9550 do not realize the theoretical value. This discrepancy could be due to two possible sources: either a slight error in the leading edge ordinates which gave rise to imperfections in the pressure distribution similar to those found by Spee[9], or interference effects due to the transition band. A combination of both of these sources of error is most likely with the former having the strongest influence; it is well known (see Ref.11) that disturbances travelling out from any imperfections in the surface shape will reflect from the sonic line and return to affect the surface pressure distribution - further downstream, as is the case here where the velocities downstream of the leading edge 'peak' are higher than expected.

5.2 Flow developments at low Mach numbers ($M_{\infty} < 0.7$) under high lift conditions

Near $M_{\infty} = 0.65$ a lift coefficient of about 0.95 is obtained before appreciable separation occurs (see Fig.7); in contrast, if the Mach number is reduced slightly the high-lift performance deteriorates, giving a usable C_L of only 0.85 at $M_{\infty} = 0.6$ but rising again to 1.0 at $M_{\infty} = 0.4$. The reasons for this behaviour are analysed in this section.

Fig.19 shows the upper-surface pressure distributions for RAE 9550 at a free stream Mach number of 0.65 at angles of incidence between 3° and 7°. At

the higher angles of incidence the supersonic flow around the leading edge extends to 20% chord, terminated by a shock wave which shows signs of an embryonic separation bubble at its foot at $\alpha = 5^{o}$. As the angle of incidence is increased, the local Mach number over the forward part of the aerofoil increases steadily and uniformly, and the shock wave terminating the supersonic region increases in strength. Eventually a stage is reached, at about $\alpha = 6^{o}$, when the separation bubble at the foot of the shock influences the trailing edge pressure (see inset to Fig.19); when this occurs the supersonic region has a maximum local Mach number of 1.58 decelerating to 1.48 just ahead of the shock, and it is this feature which leads to the high lift coefficient obtained at free stream Mach numbers near $M_{\infty} = 0.65$. Soon after the trailing edge pressure diverges the flow over the upper surface breaks down from the leading edge and separates over the entire upper surface, the separation is probably of the laminar type since it is unlikely that transition will have occurred so near to the leading edge.

The upper surface pressure distributions at $M_{\infty} = 0.7$ shown in Fig.20 are very similar to those at $M_{\infty} = 0.65$, except that the shock wave moves further rearwards (to 35% chord) with a peak Mach number of 1.53 decreasing to 1.36 just ahead of the shock. It can be seen that the separation bubble causes the trailing edge pressure to diverge at $\alpha \triangleq 4.5^{o}$ and by $\alpha = 6^{o}$ the flow breaks down across the whole upper surface.

Fig.21 shows the upper surface pressure distributions for a free stream Mach number of 0.6 and varying angles of incidence. The flow is of an entirely different nature from that at $M_{\infty} = 0.7$ (Fig.20), being dominated by a leading edge laminar (shock-induced) separation bubble which eventually bursts, leading to the collapse of the leading edge peak. From Fig.21 it can be seen that the bubble begins to form between $\alpha = 5^{o}$ and $\alpha = 6^{o}$ and commences to grow; the inset shows that the trailing edge pressure is influenced as soon as the bubble appears, even though the flow apparently reattaches ahead of 50% chord.

As the Mach number increases beyond 0.6 the supersonic region expands and develops a favourable influence on lift due to the high suctions in the supercritical region, whereas for Mach numbers near 0.6 the supersonic region is of small chordwise extent; thus the separation of the laminar boundary layer near the nose by the terminating shock wave results in adverse effects on lift.

Fig.22 shows the upper surface pressure distributions at a free stream Mach number of 0.4; these should be fairly representative of low speed pressure

distributions on this aerofoil. It can be seen that the leading-edge suction peak grows progressively to a maximum at an angle of incidence of 9.0^{o}. At this angle of incidence a separation bubble has formed immediately downstream of the leading edge peak, and the inset to Fig.22 shows that this bubble has an immediate effect on the trailing edge pressure. From Fig.22 it is apparent that as the leading edge peak collapses and the bubble grows the flow separates from the trailing edge and this separation spreads forward until eventually at $\alpha = 11^{o}$ the bubble and the trailing edge separation combine and the flow has separated over the entire upper surface.

6 COMPARISONS WITH OTHER RESULTS AND WITH THEORY

First, it is worth comparing the drag-rise Mach number of this section with that of a 'conventional' section; for example, using Ref.12 for a 12% thick aerofoil at $C_L = 0.5$, we find that $M_D = 0.71$ with a rooftop extent $x_R/c = 0.5$, or $M_D = 0.72$ with $x_R/c = 0.6$, as opposed to about 0.77 for RAE 9550.

It is also relevant to compare the performance of RAE 9550 with the few published results for similar aerofoils which are currently available. Fig.23 shows the drag divergence characteristics, deduced from measurements at NAE, Ottawa[12], of the NAE shockless lifting aerofoil No.1 (designed by the method of Ref.2) compared with the results for RAE 9550. It shows that the NAE No.1 ($t/c = 0.118$) is slightly better than RAE 9550 at all lift coefficients, but it must be remembered that the latter is a thicker section ($t/c = 0.122$).

Finally the results for RAE 9550 are compared with theoretically predicted results, using one of the best of the modern finite difference methods for the inviscid flow problem, that of Bauer, Garabedian and Korn[2].

In Fig.24a the experimental results are compared with a calculation by inviscid theory, at a Mach number of 0.76. To obtain a meaningful comparison with experiment the angle of incidence in the calculations has been adjusted (to 1.0^{o}) so that the peak Mach number just behind the leading edge agreed with the experimental value. When this was done the pressure distribution on the lower surface was reasonably well predicted except near the trailing edge; however the agreement on the upper surface was not very good.

In order to try to improve matters, a rough allowance for viscous effects was made in the following way. Using the experimental pressure distribution

shown in Fig.24a (M_∞ = 0.76, α = 1.75°, C_L = 0.41), the development of the boundary layer on both surfaces was calculated by the 'lag entrainment' method of Green *et al.* [13]. The resulting displacement surface was then added to the actual aerofoil shape and the pressure distribution calculated, by the same inviscid theory, for the modified shape. The angle of incidence was again adjusted (from 1.75° to 1.0°) in order to obtain a value of C_L of 0.41 as in the experiment. The full line in Fig.24a shows the results of this calculation, which is in good agreement with experiment over the front part of the aerofoil on both surfaces, apart from underestimating the upper surface suction level from 5% chord to 25% chord; in particular, the shock-free nature of the flow is well predicted. Near the trailing edge, however, there is a serious discrepancy on both surfaces due to the effect of the wake being neglected, causing an over-estimation of the pressures. Similar trends can be seen in Fig.24b (at M_∞ = 0.77); the position and strength of the shock are well predicted when compared with experiment but there is a similar divergence towards the trailing edge.

7 CONCLUSIONS

An aerofoil (RAE 9550) combining the upper-surface shockless pressure distribution of an NLR aerofoil with a new lower surface shape which adds rear loading has been successfully designed. At the optimum conditions (M_∞ = 0.76, $C_L \simeq 0.4$) the section has an isentropic recompression on the upper surface, with no tendancy for shocks to form at lower Mach numbers.

RAE 9550 has good separation margins at high Mach numbers and lift coefficients up to at least 0.6. The drag-divergence boundary is slightly worse than that of the NAE No.1 shockless lifting aerofoil. At the lowest Mach numbers tested (M_∞ = 0.4) the separation boundary is acceptable (a C_L of at least 1.0 is obtained before appreciable separation occurs).

At Mach numbers near 0.65 a high lift coefficient is obtained, nearly 1.0, before serious effects of boundary layer separation are observed.

Table 1

RAE 9550 ORDINATES

x/c	y/c_{upper}	y/c_{lower}	x/c	y/c_{upper}	y/c_{lower}
0	0	0	0.065	0.03442	-0.04294
0.0002	0.00291	-0.00294	0.070	0.03535	-0.04420
0.0005	0.00453	-0.00464	0.075	0.03623	-0.04538
0.001	0.00628	-0.00655	0.080	0.03706	-0.04650
0.0015	0.00756	-0.00801	0.085	0.03786	-0.04756
0.002	0.00860	-0.00923	0.090	0.03862	-0.04856
0.0025	0.00948	-0.01028	0.095	0.03936	-0.04951
0.003	0.01026	-0.01122	0.10	0.04007	-0.05042
0.0035	0.01096	-0.01207	0.11	0.04141	-0.05209
0.004	0.01161	-0.01286	0.12	0.04265	-0.05360
0.0045	0.01221	-0.01358	0.13	0.04382	-0.05497
0.005	0.01277	-0.01425	0.14	0.04491	-0.05621
0.0055	0.01329	-0.01488	0.15	0.04592	-0.05734
0.006	0.01378	-0.01547	0.16	0.04688	-0.05836
0.0065	0.01424	-0.01604	0.17	0.04778	-0.05929
0.007	0.01469	-0.01658	0.18	0.04862	-0.06012
0.0075	0.01511	-0.01711	0.19	0.04940	-0.06088
0.008	0.01552	-0.01761	0.20	0.05014	-0.06156
0.0085	0.01591	-0.01809	0.21	0.05084	-0.06217
0.009	0.01628	-0.01855	0.22	0.05149	-0.06271
0.0095	0.01664	-0.01900	0.23	0.05210	-0.06320
0.010	0.01700	-0.01944	0.24	0.05266	-0.06364
0.011	0.01767	-0.02027	0.25	0.05319	-0.06399
0.012	0.01830	-0.02106	0.26	0.05367	-0.06431
0.013	0.01890	-0.02181	0.27	0.05412	-0.06457
0.014	0.01947	-0.02253	0.28	0.05453	-0.06479
0.015	0.02002	-0.02321	0.29	0.05491	-0.06496
0.016	0.02054	-0.02387	0.30	0.05525	-0.06508
0.017	0.02103	-0.02451	0.31	0.05556	-0.06516
0.018	0.02151	-0.02512	0.32	0.05583	-0.06520
0.019	0.02197	-0.02571	0.33	0.05608	-0.06520
0.020	0.02241	-0.02629	0.34	0.05628	-0.06516
0.025	0.02439	-0.02893	0.35	0.05646	-0.06506
0.030	0.02609	-0.03126	0.36	0.05660	-0.06488
0.035	0.02759	-0.03336	0.37	0.05671	-0.06462
0.040	0.02894	-0.03527	0.38	0.05679	-0.06428
0.045	0.03019	-0.03703	0.39	0.05683	-0.06387
0.050	0.03134	-0.03867	0.40	0.05684	-0.06334
0.055	0.03243	-0.04019	0.41	0.05682	-0.06265
0.060	0.03345	-0.04161	0.42	0.05676	-0.06185

Table 1 (concluded)

x/c	y/c_{upper}	y/c_{lower}	x/c	y/c_{upper}	y/c_{lower}
0.43	0.05667	-0.06094	0.72	0.03746	-0.01456
0.44	0.05654	-0.05993	0.73	0.03630	-0.01281
0.45	0.05638	-0.05883	0.74	0.03514	-0.01109
0.46	0.05619	-0.05761	0.75	0.03398	-0.00945
0.47	0.05596	-0.05629	0.76	0.03282	-0.00790
0.48	0.05569	-0.05490	0.77	0.03166	-0.00643
0.49	0.05539	-0.05346	0.78	0.03050	-0.00501
0.50	0.05505	-0.05199	0.79	0.02934	-0.00368
0.51	0.05467	-0.05049	0.80	0.02819	-0.00247
0.52	0.05425	-0.04896	0.81	0.02703	-0.00133
0.53	0.05379	-0.04741	0.82	0.02587	-0.00029
0.54	0.05330	-0.04583	0.83	0.02471	0.00066
0.55	0.05276	-0.04424	0.84	0.02355	0.00147
0.56	0.05218	-0.04263	0.85	0.02239	0.00219
0.57	0.05156	-0.04101	0.86	0.02123	0.00278
0.58	0.05090	-0.03938	0.87	0.02007	0.00321
0.59	0.05020	-0.03772	0.88	0.01891	0.00357
0.60	0.04946	-0.03605	0.89	0.01775	0.00383
0.61	0.04867	-0.03438	0.90	0.01659	0.00397
0.62	0.04784	-0.03270	0.91	0.01543	0.00403
0.63	0.04698	-0.03096	0.92	0.01427	0.00398
0.64	0.04607	-0.02918	0.93	0.01312	0.00382
0.65	0.04512	-0.02737	0.94	0.01196	0.00355
0.66	0.04413	-0.02554	0.95	0.01080	0.00319
0.67	0.04310	-0.02370	0.96	0.00964	0.00275
0.68	0.04203	-0.02185	0.97	0.00848	0.00223
0.69	0.04093	-0.02005	0.98	0.00732	0.00160
0.70	0.03978	-0.01817	0.99	0.00616	0.00086
0.71	0.03862	-0.01634	1.00	0.00500	0.0

Table 2

PRESSURE COEFFICIENTS

$M_\infty = 0.4$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0	7.0
C_L	0.209	0.263	0.299	0.332	0.387	0.448	0.567	0.682	0.799	0.910
C_M	-0.053	-0.053	-0.054	-0.054	-0.055	-0.056	-0.056	-0.056	-0.057	-0.054
C_D	0.0112	0.0112	0.0113	0.0113	0.0113	0.0114	0.0120			

x/c	C_p									
Upper surface										
0.000	0.949	0.886	0.845	0.793	0.700	0.581	0.295	-0.041	-0.427	-0.842
0.002	0.183	0.013	-0.092	-0.214	-0.420	-0.664	-1.208	-1.807	-2.464	-3.134
0.005	-0.312	-0.512	-0.631	-0.762	-0.999	-1.266	-1.867	-2.526	-3.298	-4.175
0.009	-0.591	-0.793	-0.908	-1.035	-1.267	-1.516	-2.088	-2.714	-3.437	-4.305
0.013	-0.712	-0.892	-0.989	-1.107	-1.319	-1.542	-2.056	-2.610	-3.249	-3.947
0.018	-0.761	-0.913	-1.013	-1.119	-1.305	-1.505	-1.953	-2.416	-2.941	-3.470
0.025	-0.721	-0.853	-0.939	-1.024	-1.185	-1.346	-1.714	-2.096	-2.511	-2.932
0.035	-0.671	-0.781	-0.851	-0.922	-1.055	-1.194	-1.495	-1.804	-2.102	-2.471
0.050	-0.621	-0.712	-0.767	-0.827	-0.932	-1.046	-1.289	-1.526	-1.781	-2.057
0.075	-0.572	-0.647	-0.683	-0.735	-0.820	-0.904	-1.091	-1.268	-1.445	-1.669
0.100	-0.513	-0.575	-0.606	-0.651	-0.722	-0.794	-0.950	-1.102	-1.256	-1.421
0.150	-0.473	-0.517	-0.550	-0.583	-0.637	-0.691	-0.808	-0.923	-1.041	-1.168
0.200	-0.451	-0.488	-0.513	-0.535	-0.585	-0.625	-0.723	-0.822	-0.921	-1.015
0.260	-0.433	-0.468	-0.484	-0.507	-0.544	-0.584	-0.662	-0.740	-0.818	-0.895
0.320	-0.424	-0.448	-0.470	-0.488	-0.520	-0.549	-0.618	-0.684	-0.754	-0.810
0.380	-0.410	-0.435	-0.447	-0.468	-0.494	-0.520	-0.580	-0.633	-0.691	-0.743
0.440	-0.405	-0.428	-0.437	-0.451	-0.477	-0.497	-0.550	-0.597	-0.648	-0.687
0.500	-0.391	-0.405	-0.414	-0.432	-0.450	-0.471	-0.510	-0.554	-0.596	-0.629
0.560	-0.364	-0.377	-0.387	-0.393	-0.418	-0.431	-0.464	-0.501	-0.537	-0.558
0.620	-0.321	-0.327	-0.338	-0.345	-0.363	-0.375	-0.401	-0.431	-0.452	-0.476
0.680	-0.253	-0.269	-0.270	-0.274	-0.296	-0.303	-0.324	-0.352	-0.372	-0.383
0.740	-0.190	-0.198	-0.202	-0.206	-0.218	-0.225	-0.244	-0.264	-0.283	-0.290
0.800	-0.130	-0.135	-0.139	-0.144	-0.153	-0.158	-0.174	-0.189	-0.202	-0.206
0.850	-0.089	-0.096	-0.095	-0.100	-0.108	-0.112	-0.124	-0.136	-0.145	-0.154
0.900	-0.051	-0.056	-0.058	-0.059	-0.067	-0.067	-0.078	-0.086	-0.096	-0.099
0.950	-0.011	-0.019	-0.016	-0.015	-0.024	-0.023	-0.027	-0.034	-0.041	-0.047
0.980	0.015	0.012	0.008	0.013	0.005	0.009	0.004	-0.002	-0.009	-0.013
1.000	0.017	0.020	0.017	0.020	0.016	0.017	0.012	0.012	0.002	-0.005
Lower surface										
0.002	0.976	1.010	1.025	1.036	1.041	1.040	0.998	0.909	0.771	0.597
0.005	0.730	0.805	0.849	0.886	0.937	0.982	1.034	1.040	1.013	0.948
0.010	0.433	0.526	0.584	0.637	0.711	0.789	0.908	0.987	1.029	1.041
0.017	0.189	0.291	0.352	0.406	0.488	0.575	0.722	0.839	0.927	0.987
0.025	0.043	0.136	0.196	0.250	0.329	0.415	0.570	0.693	0.799	0.883
0.050	-0.191	-0.110	-0.058	-0.010	0.061	0.141	0.284	0.404	0.518	0.616
0.100	-0.315	-0.250	-0.212	-0.173	-0.120	-0.056	0.059	0.162	0.261	0.347
0.150	-0.351	-0.304	-0.265	-0.237	-0.192	-0.140	-0.046	0.042	0.129	0.207
0.200	-0.358	-0.314	-0.286	-0.263	-0.228	-0.181	-0.099	-0.023	0.052	0.126
0.280	-0.374	-0.337	-0.308	-0.291	-0.264	-0.225	-0.157	-0.103	-0.035	0.028
0.330	-0.381	-0.344	-0.325	-0.312	-0.287	-0.250	-0.190	-0.136	-0.076	-0.028
0.380	-0.420	-0.397	-0.371	-0.357	-0.335	-0.302	-0.250	-0.193	-0.137	-0.096
0.440	-0.387	-0.359	-0.342	-0.330	-0.311	-0.282	-0.235	-0.190	-0.146	-0.108
0.520	-0.224	-0.200	-0.189	-0.184	-0.167	-0.145	-0.110	-0.077	-0.044	-0.012
0.600	-0.086	-0.079	-0.061	-0.056	-0.047	-0.030	-0.002	0.022	0.044	0.066
0.680	0.040	0.048	0.059	0.671	0.071	0.084	0.103	0.123	0.141	0.159
0.740	0.136	0.142	0.155	0.158	0.163	0.175	0.192	0.207	0.219	0.239
0.800	0.202	0.208	0.219	0.223	0.227	0.238	0.252	0.263	0.278	0.292
0.850	0.229	0.237	0.243	0.248	0.249	0.260	0.274	0.283	0.294	0.301
0.900	0.229	0.233	0.241	0.244	0.244	0.256	0.263	0.271	0.283	0.290
0.950	0.188	0.191	0.195	0.197	0.195	0.204	0.210	0.213	0.220	0.222
0.980	0.111	0.113	0.118	0.120	0.117	0.121	0.121	0.123	0.120	0.121

$M_\infty = 0.4$

α	8.0	9.0	10.0	11.0
C_L	1.008	1.071	1.071	1.004
C_M	-0.052	-0.043	-0.058	-0.095

x/c	C_p			
Upper surface				
0.000	-1.217	-1.427	-1.351	-1.009
0.002	-3.662	-3.907	-3.771	-3.062
0.005	-4.855	-5.274	-4.893	-3.636
0.009	-5.363	-5.478	-4.697	-3.542
0.013	-4.993	-4.650	-3.591	-2.912
0.018	-3.963	-3.696	-2.983	-2.497
0.025	-3.311	-3.099	-2.460	-2.019
0.035	-2.773	-2.550	-2.231	-1.835
0.050	-2.295	-2.424	-2.115	-1.708
0.075	-1.855	-2.337	-2.058	-1.726
0.100	-1.574	-2.140	-1.941	-1.655
0.150	-1.263	-1.621	-1.703	-1.482
0.200	-1.090	-1.284	-1.470	-1.338
0.260	-0.959	-0.992	-1.220	-1.175
0.320	-0.858	-0.850	-0.997	-1.017
0.380	-0.783	-0.756	-0.835	-0.907
0.440	-0.718	-0.686	-0.711	-0.812
0.500	-0.653	-0.624	-0.616	-0.745
0.560	-0.580	-0.551	-0.537	-0.672
0.620	-0.488	-0.469	-0.472	-0.609
0.680	-0.395	-0.384	-0.395	-0.539
0.740	-0.301	-0.308	-0.352	-0.511
0.800	-0.217	-0.228	-0.306	-0.452
0.850	-0.159	-0.182	-0.268	-0.420
0.900	-0.106	-0.130	-0.238	-0.388
0.950	-0.056	-0.091	-0.216	-0.348
0.980	-0.027	-0.077	-0.200	-0.328
1.000	-0.017	-0.071	-0.188	-0.304
Lower surface				
0.002	0.414	0.288	0.309	0.436
0.005	0.860	0.802	0.807	0.869
0.010	1.031	1.017	1.018	1.030
0.017	1.021	1.033	1.034	1.026
0.025	0.941	0.968	0.970	0.951
0.050	0.696	0.734	0.737	0.721
0.100	0.420	0.462	0.471	0.453
0.150	0.273	0.309	0.310	0.295
0.200	0.180	0.210	0.212	0.196
0.280	0.075	0.098	0.091	0.076
0.330	0.021	0.046	0.036	0.011
0.380	-0.054	-0.035	-0.047	-0.075
0.440	-0.069	-0.060	-0.074	-0.104
0.520	0.014	0.015	-0.004	-0.038
0.600	0.095	0.091	0.063	0.033
0.680	0.173	0.163	0.137	0.099
0.740	0.251	0.237	0.209	0.172
0.800	0.298	0.287	0.260	0.218
0.850	0.314	0.299	0.265	0.220
0.900	0.293	0.272	0.231	0.181
0.950	0.222	0.196	0.134	0.072
0.980	0.115	0.076	-0.009	-0.097

Table 2 (continued)

$M_\infty = 0.5$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0	7.0
C_L	0.209	0.270	0.302	0.333	0.398	0.459	0.597	0.712	0.833	0.921
C_M	-0.055	-0.056	-0.056	-0.057	-0.058	-0.057	-0.058	-0.057	-0.054	-0.049
C_D	0.0110	0.0111	0.0112	0.0113	0.0115	0.0117	0.0123			

x/c	C_p									
Upper surface										
0.000	0.987	0.930	0.896	0.858	0.770	0.668	0.404	0.157	-0.101	-0.290
0.002	0.261	0.090	-0.002	-0.097	-0.303	-0.522	-1.038	-1.460	-1.832	-2.075
0.005	-0.239	-0.442	-0.553	-0.664	-0.909	-1.166	-1.795	-2.308	-2.736	-3.023
0.009	-0.549	-0.755	-0.871	-0.986	-1.233	-1.501	-2.180	-2.806	-3.350	-3.577
0.013	-0.676	-0.875	-0.980	-1.088	-1.326	-1.576	-2.244	-3.030	-3.571	-3.844
0.018	-0.748	-0.929	-1.026	-1.126	-1.340	-1.567	-2.151	-2.993	-3.738	-3.381
0.025	-0.717	-0.873	-0.956	-1.041	-1.220	-1.413	-1.870	-2.306	-2.143	-2.774
0.035	-0.673	-0.806	-0.878	-0.947	-1.098	-1.254	-1.619	-1.941	-2.510	-2.561
0.050	-0.631	-0.740	-0.799	-0.854	-0.975	-1.098	-1.384	-1.629	-2.048	-2.330
0.075	-0.586	-0.672	-0.717	-0.761	-0.857	-0.950	-1.166	-1.348	-1.596	-2.078
0.100	-0.526	-0.599	-0.637	-0.673	-0.753	-0.830	-1.008	-1.160	-1.327	-1.844
0.150	-0.490	-0.547	-0.577	-0.605	-0.666	-0.725	-0.861	-0.973	-1.083	-1.342
0.200	-0.464	-0.514	-0.538	-0.563	-0.613	-0.662	-0.772	-0.868	-0.957	-1.056
0.260	-0.449	-0.491	-0.512	-0.532	-0.573	-0.616	-0.706	-0.783	-0.856	-0.895
0.320	-0.441	-0.477	-0.493	-0.511	-0.547	-0.582	-0.658	-0.721	-0.785	-0.809
0.380	-0.428	-0.460	-0.474	-0.489	-0.520	-0.550	-0.615	-0.670	-0.721	-0.736
0.440	-0.422	-0.449	-0.463	-0.476	-0.503	-0.528	-0.585	-0.629	-0.672	-0.678
0.500	-0.407	-0.431	-0.443	-0.453	-0.477	-0.497	-0.545	-0.585	-0.617	-0.620
0.560	-0.379	-0.399	-0.409	-0.418	-0.437	-0.454	-0.494	-0.527	-0.552	-0.550
0.620	-0.330	-0.348	-0.354	-0.364	-0.380	-0.392	-0.426	-0.449	-0.470	-0.466
0.680	-0.266	-0.280	-0.286	-0.293	-0.306	-0.317	-0.342	-0.362	-0.378	-0.376
0.740	-0.192	-0.204	-0.209	-0.214	-0.226	-0.232	-0.253	-0.273	-0.284	-0.291
0.800	-0.130	-0.139	-0.144	-0.149	-0.157	-0.162	-0.179	-0.192	-0.204	-0.210
0.850	-0.087	-0.096	-0.098	-0.103	-0.109	-0.112	-0.127	-0.136	-0.149	-0.157
0.900	-0.048	-0.055	-0.058	-0.059	-0.065	-0.067	-0.078	-0.086	-0.095	-0.109
0.950	-0.005	-0.010	-0.012	-0.013	-0.018	-0.019	-0.024	-0.033	-0.043	-0.063
0.980	0.023	0.018	0.017	0.016	0.013	0.012	0.007	-0.001	-0.014	-0.036
1.000	0.027	0.023	0.023	0.022	0.020	0.021	0.018	0.010	-0.008	-0.035
Lower surface										
0.002	0.987	1.025	1.040	1.051	1.064	1.064	1.033	0.969	0.878	0.796
0.005	0.735	0.816	0.853	0.886	0.946	0.992	1.052	1.064	1.054	1.029
0.010	0.431	0.533	0.583	0.628	0.713	0.789	0.918	0.990	1.039	1.057
0.017	0.186	0.291	0.344	0.390	0.487	0.571	0.731	0.834	0.919	0.969
0.025	0.033	0.133	0.184	0.232	0.326	0.411	0.576	0.690	0.791	0.854
0.050	-0.209	-0.123	-0.078	-0.037	0.048	0.126	0.286	0.401	0.507	0.584
0.100	-0.334	-0.270	-0.235	-0.203	-0.137	-0.075	0.055	0.153	0.251	0.318
0.150	-0.375	-0.323	-0.296	-0.269	-0.213	-0.162	-0.050	0.034	0.118	0.179
0.200	-0.385	-0.342	-0.317	-0.294	-0.246	-0.202	-0.107	-0.033	0.041	0.095
0.280	-0.396	-0.361	-0.342	-0.323	-0.285	-0.249	-0.171	-0.109	-0.047	-0.005
0.330	-0.408	-0.377	-0.360	-0.345	-0.306	-0.276	-0.206	-0.150	-0.093	-0.055
0.380	-0.451	-0.423	-0.407	-0.392	-0.359	-0.332	-0.264	-0.216	-0.162	-0.127
0.440	-0.408	-0.385	-0.373	-0.361	-0.332	-0.308	-0.253	-0.210	-0.167	-0.137
0.520	-0.230	-0.214	-0.205	-0.197	-0.177	-0.158	-0.118	-0.086	-0.055	-0.035
0.600	-0.089	-0.077	-0.070	-0.064	-0.048	-0.034	-0.005	0.019	0.042	0.055
0.680	0.045	0.540	0.060	0.064	0.076	0.086	0.108	0.125	0.141	0.149
0.740	0.144	0.151	0.158	0.162	0.173	0.180	0.200	0.213	0.227	0.231
0.800	0.211	0.219	0.224	0.227	0.236	0.244	0.262	0.273	0.284	0.286
0.850	0.240	0.247	0.250	0.253	0.262	0.268	0.283	0.293	0.300	0.301
0.900	0.240	0.245	0.248	0.253	0.259	0.263	0.276	0.282	0.287	0.284
0.950	0.198	0.200	0.202	0.205	0.208	0.211	0.218	0.220	0.220	0.211
0.980	0.122	0.122	0.123	0.125	0.126	0.126	0.127	0.125	0.120	0.102

$M_\infty = 0.5$

α	8.0	9.0	10.0	11.0
C_L	0.980	1.005	1.001	0.994
C_M	-0.049	-0.062	-0.084	-0.113

x/c	C_p			
Upper surface				
0.000	-0.416	-0.485	-0.486	-0.448
0.002	-2.218	-2.276	-2.252	-2.158
0.005	-3.234	-3.293	-3.186	-2.853
0.009	-3.559	-3.246	-3.105	-2.833
0.013	-3.356	-2.647	-2.356	-2.083
0.018	-2.671	-2.352	-2.087	-1.791
0.025	-2.454	-2.196	-1.954	-1.656
0.035	-2.319	-2.087	-1.842	-1.603
0.050	-2.169	-1.985	-1.777	-1.513
0.075	-2.083	-1.941	-1.734	-1.545
0.100	-1.994	-1.893	-1.704	-1.480
0.150	-1.730	-1.732	-1.581	-1.375
0.200	-1.422	-1.519	-1.418	-1.279
0.260	-1.088	-1.244	-1.220	-1.141
0.320	-0.878	-1.008	-1.048	-1.041
0.380	-0.743	-0.830	-0.883	-0.917
0.440	-0.660	-0.704	-0.771	-0.849
0.500	-0.594	-0.614	-0.680	-0.778
0.560	-0.524	-0.534	-0.607	-0.715
0.620	-0.444	-0.456	-0.535	-0.666
0.680	-0.366	-0.395	-0.482	-0.617
0.740	-0.301	-0.346	-0.447	-0.579
0.800	-0.233	-0.292	-0.401	-0.541
0.850	-0.187	-0.254	-0.365	-0.505
0.900	-0.148	-0.223	-0.341	-0.468
0.950	-0.112	-0.197	-0.312	-0.437
0.980	-0.094	-0.181	-0.297	-0.423
1.000	-0.096	-0.180	-0.281	-0.387
Lower surface				
0.002	0.734	0.685	0.678	0.691
0.005	1.006	0.987	0.983	0.984
0.010	1.064	1.063	1.064	1.064
0.017	0.998	1.012	1.017	1.018
0.025	0.894	0.916	0.922	0.924
0.050	0.633	0.664	0.673	0.676
0.100	0.366	0.395	0.405	0.407
0.150	0.222	0.246	0.252	0.253
0.200	0.131	0.152	0.155	0.154
0.280	0.027	0.041	0.036	0.029
0.330	-0.029	-0.018	-0.026	-0.036
0.380	-0.107	-0.099	-0.113	-0.126
0.440	-0.123	-0.121	-0.140	-0.161
0.520	-0.029	-0.036	-0.059	-0.083
0.600	0.057	0.045	0.019	-0.008
0.680	0.144	0.130	0.100	0.069
0.740	0.225	0.208	0.180	0.147
0.800	0.276	0.259	0.227	0.196
0.850	0.288	0.266	0.232	0.196
0.900	0.267	0.240	0.199	0.157
0.950	0.185	0.145	0.091	0.035
0.980	0.060	0.003	-0.071	-0.152

Table 2 (continued)

$M_\infty = 0.6$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0	7.0
C_L	0.219	0.289	0.324	0.357	0.432	0.503	0.643	0.776	0.880	0.921
C_M	-0.059	-0.059	-0.060	-0.060	-0.061	-0.061	-0.058	-0.055	-0.049	-0.047
C_D	0.0110	0.0112	0.0105	0.0113	0.0116	0.0119	0.0143			

x/c	C_p									
Upper surface										
0.000	1.026	0.975	0.946	0.913	0.836	0.752	0.588	0.427	0.294	0.207
0.002	0.335	0.178	0.098	0.013	-0.168	-0.339	-0.631	-0.872	-1.058	-1.168
0.005	-0.167	-0.361	-0.461	-0.567	-0.787	-0.988	-1.318	-1.590	-1.779	-1.892
0.009	-0.504	-0.716	-0.824	-0.941	-1.189	-1.410	-1.764	-2.070	-2.292	-2.381
0.013	-0.660	-0.873	-0.985	-1.106	-1.376	-1.629	-2.024	-2.296	-2.507	-2.612
0.018	-0.761	-0.966	-1.077	-1.197	-1.487	-1.825	-2.163	-2.462	-2.644	-2.739
0.025	-0.747	-0.927	-1.025	-1.130	-1.368	-1.739	-2.269	-2.512	-2.715	-2.774
0.035	-0.714	-0.869	-0.949	-1.038	-1.232	-1.437	-2.290	-2.540	-2.725	-2.183
0.050	-0.675	-0.803	-0.870	-0.941	-1.095	-1.242	-1.972	-2.507	-2.430	-1.974
0.075	-0.630	-0.731	-0.783	-0.839	-0.951	-1.058	-1.328	-1.805	-1.933	-1.893
0.100	-0.566	-0.651	-0.694	-0.740	-0.832	-0.922	-1.091	-1.596	-1.832	-1.821
0.150	-0.530	-0.595	-0.629	-0.665	-0.735	-0.807	-0.919	-1.162	-1.590	-1.640
0.200	-0.506	-0.561	-0.589	-0.618	-0.678	-0.736	-0.836	-0.915	-1.309	-1.449
0.260	-0.491	-0.536	-0.561	-0.586	-0.634	-0.682	-0.767	-0.819	-0.997	-1.210
0.320	-0.481	-0.519	-0.541	-0.562	-0.603	-0.643	-0.717	-0.769	-0.819	-0.994
0.380	-0.469	-0.501	-0.520	-0.539	-0.576	-0.610	-0.671	-0.718	-0.727	-0.820
0.440	-0.462	-0.491	-0.507	-0.527	-0.554	-0.584	-0.636	-0.675	-0.669	-0.700
0.500	-0.446	-0.470	-0.485	-0.501	-0.525	-0.549	-0.592	-0.623	-0.613	-0.608
0.560	-0.412	-0.432	-0.444	-0.461	-0.478	-0.499	-0.533	-0.560	-0.547	-0.529
0.620	-0.358	-0.375	-0.384	-0.399	-0.413	-0.429	-0.456	-0.477	-0.463	-0.446
0.680	-0.285	-0.299	-0.308	-0.316	-0.329	-0.343	-0.363	-0.381	-0.375	-0.375
0.740	-0.204	-0.214	-0.221	-0.232	-0.239	-0.250	-0.267	-0.284	-0.289	-0.316
0.800	-0.137	-0.145	-0.151	-0.159	-0.165	-0.172	-0.186	-0.198	-0.209	-0.255
0.850	-0.091	-0.098	-0.102	-0.109	-0.113	-0.121	-0.130	-0.142	-0.154	-0.213
0.900	-0.049	-0.054	-0.058	-0.062	-0.065	-0.071	-0.079	-0.090	-0.107	-0.176
0.950	-0.004	-0.006	-0.009	-0.017	-0.015	-0.018	-0.026	-0.036	-0.060	-0.143
0.980	0.027	0.024	0.022	0.017	0.018	0.014	0.007	-0.004	-0.032	-0.126
1.000	0.032	0.032	0.030	0.027	0.026	0.024	0.016	0.001	-0.035	-0.129
Lower surface										
0.002	1.011	1.050	1.065	1.075	1.092	1.093	1.081	1.047	1.005	0.975
0.005	0.758	0.838	0.874	0.904	0.966	1.012	1.068	1.089	1.093	1.092
0.010	0.453	0.555	0.602	0.644	0.735	0.804	0.913	0.986	1.032	1.052
0.017	0.201	0.310	0.361	0.405	0.505	0.587	0.722	0.820	0.891	0.925
0.025	0.041	0.149	0.198	0.241	0.342	0.425	0.568	0.677	0.754	0.799
0.050	-0.221	-0.125	-0.080	-0.041	0.054	0.134	0.273	0.388	0.472	0.523
0.100	-0.364	-0.288	-0.253	-0.225	-0.145	-0.079	0.039	0.142	0.217	0.263
0.150	-0.414	-0.351	-0.321	-0.296	-0.230	-0.173	-0.070	0.019	0.087	0.126
0.200	-0.426	-0.371	-0.346	-0.329	-0.269	-0.220	-0.130	-0.052	0.008	0.041
0.280	-0.438	-0.395	-0.376	-0.360	-0.313	-0.271	-0.196	-0.131	-0.082	-0.060
0.330	-0.453	-0.414	-0.395	-0.383	-0.339	-0.302	-0.233	-0.174	-0.131	-0.113
0.380	-0.502	-0.467	-0.450	-0.437	-0.397	-0.365	-0.301	-0.245	-0.207	-0.194
0.440	-0.450	-0.421	-0.408	-0.399	-0.366	-0.339	-0.285	-0.240	-0.209	-0.203
0.520	-0.248	-0.227	-0.218	-0.215	-0.189	-0.170	-0.132	-0.100	-0.082	-0.084
0.600	-0.092	-0.078	-0.072	-0.070	-0.050	-0.036	-0.009	0.013	0.026	0.017
0.680	0.049	0.061	0.066	0.065	0.082	0.092	0.113	0.129	0.133	0.119
0.740	0.152	0.162	0.166	0.167	0.182	0.191	0.207	0.220	0.223	0.208
0.800	0.220	0.230	0.235	0.236	0.247	0.255	0.271	0.282	0.282	0.266
0.850	0.250	0.259	0.263	0.263	0.275	0.282	0.295	0.303	0.300	0.279
0.900	0.253	0.259	0.263	0.262	0.272	0.277	0.287	0.292	0.286	0.258
0.950	0.209	0.213	0.215	0.213	0.220	0.223	0.227	0.229	0.215	0.172
0.980	0.132	0.133	0.133	0.131	0.133	0.133	0.132	0.127	0.102	0.039

$M_\infty = 0.6$

α	8.0	9.0	10.0
C_L	0.939	0.969	0.996
C_M	-0.081	-0.099	-0.116

x/c	C_p		
Upper surface			
0.000	0.157	0.108	0.059
0.002	-1.225	-1.276	-1.328
0.005	-1.974	-2.061	-2.132
0.009	-2.412	-2.422	-2.380
0.013	-2.631	-2.553	-2.414
0.018	-2.466	-2.192	-2.081
0.025	-1.997	-1.893	-1.895
0.035	-1.857	-1.805	-1.740
0.050	-1.789	-1.714	-1.685
0.075	-1.712	-1.660	-1.625
0.100	-1.660	-1.596	-1.593
0.150	-1.527	-1.478	-1.456
0.200	-1.390	-1.363	-1.323
0.260	-1.219	-1.206	-1.165
0.320	-1.049	-1.054	-1.032
0.380	-0.898	-0.917	-0.937
0.440	-0.779	-0.826	-0.864
0.500	-0.684	-0.753	-0.809
0.560	-0.602	-0.676	-0.753
0.620	-0.524	-0.612	-0.700
0.680	-0.463	-0.554	-0.644
0.740	-0.420	-0.518	-0.610
0.800	-0.367	-0.465	-0.561
0.850	-0.328	-0.421	-0.521
0.900	-0.294	-0.389	-0.491
0.950	-0.260	-0.354	-0.453
0.980	-0.246	-0.339	-0.439
1.000	-0.233	-0.316	-0.401
Lower surface			
0.002	0.953	0.925	0.902
0.005	1.088	1.083	1.076
0.010	1.061	1.073	1.080
0.017	0.948	0.968	0.986
0.025	0.825	0.849	0.873
0.050	0.551	0.584	0.612
0.100	0.288	0.319	0.344
0.150	0.145	0.170	0.191
0.200	0.058	0.079	0.094
0.280	-0.051	-0.036	-0.028
0.330	-0.109	-0.098	-0.095
0.380	-0.174	-0.189	-0.190
0.440	-0.210	-0.211	-0.220
0.520	-0.100	-0.108	-0.122
0.600	-0.001	-0.017	-0.034
0.680	0.098	0.080	0.058
0.740	0.185	0.167	0.142
0.800	0.241	0.222	0.199
0.850	0.252	0.228	0.203
0.900	0.225	0.194	0.164
0.950	0.124	0.085	0.041
0.980	-0.012	-0.087	-0.149

Table 2 (continued)

$M_\infty = 0.65$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0	7.0
C_L	0.217	0.296	0.331	0.368	0.441	0.515	0.677	0.835	0.966	0.895
C_H	-0.061	-0.064	-0.064	-0.063	-0.062	-0.062	-0.058	-0.052	-0.052	-0.074
x/c					C_p					
Upper surface										
0.000	1.053	1.009	0.984	0.955	0.893	0.830	0.698	0.568	0.459	0.427
0.002	0.398	0.262	0.190	0.115	-0.028	-0.157	-0.390	-0.589	-0.741	-0.786
0.005	-0.098	-0.270	-0.359	-0.449	-0.620	-0.766	-1.024	-1.241	-1.403	-1.442
0.009	-0.441	-0.632	-0.732	-0.832	-1.016	-1.167	-1.435	-1.676	-1.861	-1.907
0.013	-0.615	-0.814	-0.920	-1.029	-1.225	-1.356	-1.671	-1.885	-2.056	-2.104
0.018	-0.739	-0.946	-1.063	-1.188	-1.430	-1.587	-1.803	-2.047	-2.200	-2.226
0.025	-0.742	-0.931	-1.040	-1.160	-1.464	-1.672	-1.928	-2.111	-2.261	-2.303
0.035	-0.719	-0.886	-0.980	-1.081	-1.407	-1.688	-1.972	-2.154	-2.291	-2.282
0.050	-0.692	-0.832	-0.909	-0.992	-1.175	-1.609	-1.954	-2.155	-2.296	-2.028
0.075	-0.651	-0.761	-0.820	-0.881	-1.000	-1.134	-1.932	-2.158	-2.293	-1.694
0.100	-0.588	-0.679	-0.727	-0.776	-0.873	-0.952	-1.829	-2.067	-2.225	-1.604
0.150	-0.554	-0.625	-0.662	-0.700	-0.776	-0.838	-0.996	-1.989	-2.144	-1.486
0.200	-0.532	-0.591	-0.623	-0.654	-0.717	-0.773	-0.826	-1.223	-1.540	-1.375
0.260	-0.517	-0.567	-0.594	-0.619	-0.672	-0.720	-0.775	-0.944	-1.274	-1.227
0.320	-0.509	-0.552	-0.574	-0.597	-0.641	-0.682	-0.743	-0.761	-1.120	-1.065
0.380	-0.496	-0.534	-0.553	-0.573	-0.610	-0.645	-0.704	-0.695	-0.911	-0.910
0.440	-0.490	-0.522	-0.539	-0.557	-0.589	-0.619	-0.670	-0.670	-0.726	-0.778
0.500	-0.472	-0.501	-0.515	-0.529	-0.557	-0.581	-0.625	-0.632	-0.618	-0.671
0.560	-0.436	-0.459	-0.471	-0.483	-0.505	-0.526	-0.562	-0.574	-0.544	-0.578
0.620	-0.378	-0.396	-0.406	-0.415	-0.433	-0.449	-0.477	-0.490	-0.464	-0.499
0.680	-0.298	-0.313	-0.320	-0.328	-0.341	-0.354	-0.377	-0.391	-0.377	-0.430
0.740	-0.212	-0.223	-0.230	-0.236	-0.247	-0.257	-0.276	-0.293	-0.295	-0.378
0.800	-0.141	-0.150	-0.155	-0.160	-0.169	-0.176	-0.192	-0.205	-0.214	-0.327
0.850	-0.093	-0.101	-0.105	-0.108	-0.116	-0.121	-0.134	-0.147	-0.160	-0.286
0.900	-0.049	-0.055	-0.058	-0.061	-0.066	-0.070	-0.081	-0.092	-0.109	-0.254
0.950	-0.003	-0.007	-0.009	-0.011	-0.014	-0.017	-0.026	-0.037	-0.057	-0.224
0.980	0.028	0.025	0.023	0.021	0.019	0.015	0.007	-0.003	-0.029	-0.206
1.000	0.038	0.037	0.035	0.034	0.031	0.028	0.019	0.004	-0.030	-0.198
Lower surface										
0.002	1.019	1.058	1.074	1.085	1.103	1.110	1.106	1.086	1.057	1.046
0.005	0.763	0.840	0.875	0.907	0.964	1.006	1.066	1.097	1.109	1.109
0.010	0.456	0.555	0.601	0.644	0.726	0.792	0.900	0.975	1.023	1.035
0.017	0.202	0.308	0.357	0.405	0.496	0.573	0.703	0.804	0.872	0.889
0.025	-0.023	0.098	0.107	0.212	0.264	0.310	0.523	0.560	0.671	0.679
0.050	-0.236	-0.139	-0.094	-0.049	0.039	0.116	0.256	0.370	0.454	0.474
0.100	-0.394	-0.313	-0.275	-0.237	-0.165	-0.098	0.024	0.128	0.204	0.219
0.150	-0.448	-0.380	-0.348	-0.316	-0.253	-0.195	-0.087	0.005	0.073	0.081
0.200	-0.461	-0.403	-0.375	-0.348	-0.294	-0.243	-0.148	-0.065	-0.004	-0.002
0.280	-0.474	-0.428	-0.406	-0.383	-0.338	-0.296	-0.216	-0.145	-0.095	-0.102
0.330	-0.490	-0.449	-0.429	-0.408	-0.367	-0.329	-0.256	-0.191	-0.146	-0.159
0.380	-0.545	-0.507	-0.489	-0.469	-0.432	-0.396	-0.329	-0.267	-0.227	-0.247
0.440	-0.484	-0.455	-0.440	-0.425	-0.395	-0.365	-0.309	-0.259	-0.227	-0.255
0.520	-0.260	-0.241	-0.230	-0.221	-0.201	-0.180	-0.142	-0.108	-0.089	-0.124
0.600	-0.096	-0.082	-0.074	-0.067	-0.053	-0.038	-0.011	0.013	0.024	-0.013
0.680	0.023	0.098	0.089	0.069	0.042	0.061	0.083	0.078	0.125	0.087
0.740	0.155	0.165	0.171	0.176	0.186	0.196	0.213	0.227	0.229	0.189
0.800	0.224	0.235	0.240	0.244	0.254	0.262	0.277	0.290	0.292	0.250
0.850	0.255	0.265	0.269	0.273	0.281	0.289	0.301	0.312	0.309	0.262
0.900	0.260	0.267	0.270	0.273	0.280	0.285	0.295	0.301	0.296	0.240
0.950	0.217	0.221	0.223	0.223	0.227	0.230	0.234	0.237	0.225	0.143
0.980	0.139	0.139	0.140	0.140	0.139	0.139	0.138	0.134	0.113	-0.005

$M_\infty = 0.65$

α	8.0	9.0
C_L	0.907	0.930
C_H	-0.099	-0.117
x/c	C_p	
Upper surface		
0.000	0.377	0.326
0.002	-0.852	-0.916
0.005	-1.511	-1.586
0.009	-1.967	-1.997
0.013	-2.167	-2.199
0.018	-2.266	-2.147
0.025	-2.206	-1.857
0.035	-1.821	-1.675
0.050	-1.623	-1.545
0.075	-1.552	-1.495
0.100	-1.510	-1.450
0.150	-1.399	-1.367
0.200	-1.299	-1.255
0.260	-1.172	-1.142
0.320	-1.040	-1.024
0.380	-0.917	-0.927
0.440	-0.819	-0.854
0.500	-0.736	-0.798
0.560	-0.662	-0.744
0.620	-0.599	-0.691
0.680	-0.541	-0.636
0.740	-0.505	-0.609
0.800	-0.456	-0.561
0.850	-0.416	-0.520
0.900	-0.386	-0.485
0.950	-0.354	-0.452
0.980	-0.337	-0.437
1.000	-0.309	-0.396
Lower surface		
0.002	1.030	1.009
0.005	1.109	1.109
0.010	1.048	1.064
0.017	0.913	0.939
0.025	0.711	0.742
0.050	0.503	0.539
0.100	0.244	0.276
0.150	0.101	0.127
0.200	0.012	0.034
0.280	-0.098	-0.085
0.330	-0.158	-0.152
0.380	-0.254	-0.253
0.440	-0.267	-0.274
0.520	-0.143	-0.157
0.600	-0.037	-0.054
0.680	0.057	0.001
0.740	0.162	0.141
0.800	0.221	0.200
0.850	0.231	0.207
0.900	0.200	0.171
0.950	0.094	0.052
0.980	-0.079	-0.139

Table 2 (continued)

$M_\infty = 0.7$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0	7.0
C_L	0.236	0.315	0.355	0.397	0.480	0.573	0.789	0.938	0.899	0.897
C_M	-0.064	-0.066	-0.066	-0.066	-0.066	-0.064	-0.063	-0.081	-0.095	-0.108
C_D	0.0115	0.0117	0.0117	0.0120	0.0126	0.0145	0.0254	0.0535		

x/c	C_p									
Upper surface										
0.000	1.077	1.040	1.018	0.997	0.950	0.899	0.798	0.716	0.674	0.619
0.002	0.453	0.338	0.279	0.223	0.115	0.014	-0.164	-0.294	-0.369	-0.452
0.005	-0.031	-0.173	-0.247	-0.310	-0.431	-0.544	-0.740	-0.878	-0.963	-1.055
0.009	-0.375	-0.531	-0.607	-0.676	-0.800	-0.914	-1.115	-1.280	-1.370	-1.466
0.013	-0.579	-0.748	-0.831	-0.904	-1.036	-1.139	-1 367	-1.468	-1.561	-1.662
0.018	-0.726	-0.194	-1.017	-1.116	-1.231	-1.337	-1.497	-1.629	-1 713	-1.804
0.025	-0.750	-0.942	-1.043	-1.140	-1.287	-1.423	-1.604	-1.720	-1.784	-1.842
0.035	-0.753	-0.929	-1.029	-1.164	-1.321	-1.463	-1.656	-1.763	-1.821	-1.845
0.050	-0.743	-0.919	-1.045	-1.132	-1.325	-1.468	-1.667	-1.779	-1.821	-1.797
0.075	-0.704	-0.834	-0.911	-1.095	-1.342	-1.478	-1.680	-1.797	-1.805	-1.710
0.100	-0.634	-0.736	-0.791	-0.832	-1.263	-1.424	-1.627	-1.749	-1.712	-1.624
0.150	-0.601	-0.681	-0.725	-0.764	-0.772	-1.369	-1.592	-1.717	-1.572	-1.453
0.200	-0.580	-0.648	-0.684	-0.719	-0.753	-0.890	-1.560	-1.690	-1.451	-1.288
0.260	-0.565	-0.622	-0.653	-0.683	-0.730	-0.698	-1.545	-1.681	-1.286	-1.127
0.320	-0.557	-0.606	-0.633	-0.659	-0.704	-0.708	-1.366	-1.620	-1.106	-1.018
0.380	-0.543	-0.587	-0.609	-0.631	-0.672	-0.693	-0.776	-0.970	-0.930	-0.934
0.440	-0.537	-0.574	-0.593	-0.613	-0.648	-0.673	-0.638	-0.889	-0.848	-0.869
0.500	-0.516	-0.547	-0.563	-0.579	-0.607	-0.632	-0.578	-0.798	-0.776	-0.796
0.560	-0.473	-0.498	-0.510	-0.523	-0.546	-0.566	-0.532	-0.686	-0.695	-0.723
0.620	-0.403	-0.424	-0.433	-0.443	-0.460	-0.477	-0.463	-0.559	-0.612	-0.654
0.680	-0.314	-0.330	-0.337	-0.344	-0.358	-0.372	-0.372	-0.440	-0.527	-0.589
0.740	-0.220	-0.233	-0.239	-0.245	-0.255	-0.266	-0.277	-0.342	-0.476	-0.550
0.800	-0.144	-0.155	-0.159	-0.164	-0.173	-0.183	-0.193	-0.248	-0.391	-0.481
0.850	-0.094	-0.102	-0.106	-0.110	-0.117	-0.125	-0.135	-0.184	-0.330	-0.434
0.900	-0.048	-0.054	-0.057	-0.060	-0.065	-0.072	-0.081	-0.130	-0.281	-0.396
0.950	0.001	-0.003	-0.005	-0.008	-0.012	-0.018	-0.027	-0.084	-0.234	-0.356
0.980	0.034	0.029	0.027	0.025	0.021	0.016	0.008	-0.060	-0.215	-0.338
1.000	0.047	0.043	0.041	0.039	0.035	0.030	0.016	-0.057	-0.181	-0.296
Lower surface										
0.002	1.039	1.074	1.086	1.100	1.116	1.126	1.129	1.122	1.113	1.102
0.005	0.785	0.854	0.885	0.915	0.966	1.006	1.067	1.096	1.109	1.118
0.010	0.480	0.570	0.611	0.651	0.724	0.786	0.888	0.948	0.981	1.010
0.017	0.228	0.324	0.370	0.414	0.496	0.568	0.691	0.766	0.808	0.848
0.025	0.061	0.158	0.204	0.249	0.332	0.408	0.538	0.620	0.665	0.708
0.050	-0.228	-0.134	-0.090	-0.046	0.037	0.113	0.245	0.331	0.380	0.425
0.100	-0.408	-0.327	-0.288	-0.250	-0.176	-0.108	0.013	0.090	0.135	0.173
0.150	-0.477	-0.406	-0.372	-0.337	-0.272	-0.211	-0.102	-0.033	0.000	0.032
0.200	-0.496	-0.434	-0.404	-0.375	-0.317	-0.263	-0.164	-0.103	-0.077	-0.050
0.280	-0.514	-0.464	-0.439	-0.415	-0.366	-0.321	-0.237	-0.187	-0.176	-0.162
0.330	-0.537	-0.490	-0.468	-0.445	-0.401	-0.359	-0.281	-0.237	-0.230	-0.221
0.380	-0.604	-0.560	-0.539	-0.518	-0.475	-0.435	-0.361	-0.321	-0.319	-0.317
0.440	-0.524	-0.493	-0.478	-0.462	-0.429	-0.398	-0.339	-0.310	-0.318	-0.325
0.520	-0.268	-0.249	-0.240	-0.230	-0.210	-0.190	-0.152	-0.139	-0.166	-0.181
0.600	-0.095	-0.081	-0.074	-0.068	-0.053	-0.040	-0.013	-0.008	-0.033	-0.054
0.680	0.057	0.068	0.073	0.079	0.090	0.099	0.119	0.118	0.088	0.066
0.740	0.161	0.172	0.176	0.182	0.192	0.201	0.219	0.216	0.186	0.163
0.800	0.230	0.241	0.245	0.251	0.260	0.269	0.285	0.280	0.254	0.230
0.850	0.263	0.272	0.275	0.281	0.289	0.296	0.310	0.301	0.270	0.240
0.900	0.268	0.275	0.278	0.281	0.288	0.293	0.303	0.288	0.249	0.214
0.950	0.227	0.230	0.230	0.233	0.236	0.238	0.243	0.214	0.160	0.111
0.980	0.148	0.148	0.147	0.147	0.146	0.145	0.143	0.094	0.010	-0.063

$M_\infty = 0.7$

α	8.0
C_L	0.865
C_M	-0.118

x/c	C_p
Upper surface	
0.000	0.566
0.002	-0.524
0.005	-1.123
0.009	-1.541
0.013	-1.726
0.018	-1.859
0.025	-1.903
0.035	-1.840
0.050	-1.618
0.075	-1.403
0.100	-1.329
0.150	-1.242
0.200	-1.166
0.260	-1.087
0.320	-1.004
0.380	-0.921
0.440	-0.846
0.500	-0.787
0.560	-0.727
0.620	-0.678
0.680	-0.629
0.740	-0.599
0.800	-0.559
0.850	-0.523
0.900	-0.494
0.950	-0.460
0.980	-0.444
1.000	-0.404
Lower surface	
0.002	1.091
0.005	1.124
0.010	1.029
0.017	0.876
0.025	0.738
0.050	0.454
0.100	0.198
0.150	0.051
0.200	-0.038
0.280	-0.154
0.330	-0.224
0.380	-0.330
0.440	-0.346
0.520	-0.200
0.600	-0.081
0.680	0.038
0.740	0.136
0.800	0.200
0.850	0.209
0.900	0.177
0.950	0.058
0.980	-0.135

Table 2 (continued)

$M_\infty = 0.72$ | $M_\infty = 0.73$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0	5.0	4.0
C_L	0.240	0.324	0.367	0.415	0.516	0.620	0.831	0.852	0.822
C_M	-0.066	-0.067	-0.067	-0.067	-0.066	-0.064	-0.080	0.096	-0.094
C_D	0.0116	0.0118	0.0119	0.0121	0.0133	0.0169	0.0389	0.0709	

x/c	C_p								
Upper surface									
0.000	1.088	1.054	1.035	1.013	0.971	0.924	0.845	0.793	0.873
0.002	0.481	0.372	0.323	0.264	0.169	0.075	-0.068	-0.154	-0.018
0.005	0.007	-0.128	-0.190	-0.254	-0.361	-0.466	-0.623	-0.715	-0.564
0.009	-0.333	-0.480	-0.544	-0.613	-0.721	-0.822	-0.983	-1.099	-0.922
0.013	-0.541	-0.698	-0.766	-0.838	-0.953	-1.041	-1.228	-1.301	-1.143
0.018	-0.696	-0.872	-0.958	-1.045	-1.146	-1.236	-1.378	-1.440	-1.305
0.025	-0.734	-0.904	-1.007	-1.073	-1.210	-1.322	-1.470	-1.554	-1.401
0.035	-0.749	-0.908	-1.011	-1.109	-1.248	-1.366	-1.527	-1.598	-1.456
0.050	-0.758	-0.963	-1.032	-1.112	-1.251	-1.377	-1.533	-1.612	-1.458
0.075	-0.726	-0.907	-1.086	-1.178	-1.293	-1.405	-1.553	-1.640	-1.481
0.100	-0.653	-0.764	-0.835	-1.096	-1.241	-1.352	-1.511	-1.588	-1.441
0.150	-0.625	-0.713	-0.751	-0.732	-1.213	-1.337	-1.490	-1.572	-1.427
0.200	-0.606	-0.682	-0.717	-0.738	-1.140	-1.308	-1.470	-1.543	-1.415
0.260	-0.591	-0.656	-0.686	-0.719	-0.667	-1.299	-1.468	-1.428	-1.415
0.320	-0.583	-0.640	-0.667	-0.697	-0.696	-0.915	-1.474	-1.180	-1.426
0.380	-0.571	-0.619	-0.642	-0.668	-0.692	-0.617	-1.482	-0.946	-1.436
0.440	-0.564	-0.606	-0.624	-0.647	-0.677	-0.613	-0.943	-0.813	-0.927
0.500	-0.540	-0.575	-0.590	-0.608	-0.634	-0.607	-0.741	-0.747	-0.738
0.560	-0.492	-0.519	-0.530	-0.544	-0.565	-0.558	-0.625	-0.677	-0.663
0.620	-0.417	-0.438	-0.446	-0.456	-0.472	-0.474	-0.500	-0.604	-0.573
0.680	-0.321	-0.337	-0.343	-0.351	-0.364	-0.370	-0.386	-0.515	-0.476
0.740	-0.224	-0.236	-0.241	-0.248	-0.258	-0.266	-0.287	-0.450	-0.380
0.800	-0.146	-0.157	-0.160	-0.165	-0.174	-0.181	-0.195	-0.367	-0.277
0.850	-0.093	-0.102	-0.105	-0.109	-0.117	-0.123	-0.131	-0.302	-0.199
0.900	-0.046	-0.053	-0.056	-0.058	-0.065	-0.069	-0.080	-0.251	-0.134
0.950	0.003	-0.002	-0.004	-0.006	-0.010	-0.014	-0.030	-0.201	-0.077
0.980	0.036	0.031	0.029	0.028	0.023	0.019	-0.002	-0.178	-0.050
1.000	0.046	0.043	0.043	0.040	0.035	0.029	-0.004	-0.147	-0.043
Lower surface									
0.002	1.043	1.078	1.092	1.105	1.121	1.131	1.137	1.135	1.140
0.005	0.788	0.858	0.887	0.920	0.967	1.008	1.061	1.086	1.053
0.010	0.485	0.574	0.613	0.656	0.725	0.788	0.874	0.919	0.860
0.017	0.233	0.329	0.371	0.421	0.498	0.571	0.673	0.731	0.656
0.025	0.066	0.162	0.206	0.257	0.335	0.411	0.520	0.581	0.502
0.050	-0.228	-0.134	-0.090	-0.040	0.039	0.117	0.227	0.289	0.209
0.100	-0.419	-0.335	-0.296	-0.251	-0.178	-0.106	-0.006	0.050	-0.024
0.150	-0.496	-0.420	-0.384	-0.343	-0.278	-0.213	-0.121	-0.076	-0.139
0.200	-0.517	-0.452	-0.421	-0.383	-0.325	-0.266	-0.184	-0.146	-0.203
0.280	-0.539	-0.484	-0.458	-0.427	-0.378	-0.327	-0.258	-0.235	-0.277
0.330	-0.565	-0.514	-0.491	-0.462	-0.416	-0.368	-0.305	-0.287	-0.326
0.380	-0.642	-0.594	-0.570	-0.542	-0.498	-0.451	-0.390	-0.378	-0.416
0.440	-0.547	-0.515	-0.498	-0.478	-0.445	-0.410	-0.364	-0.365	-0.387
0.520	-0.273	-0.255	-0.245	-0.232	-0.213	-0.191	-0.165	-0.182	-0.179
0.600	-0.094	-0.082	-0.075	-0.066	-0.053	-0.037	-0.020	-0.040	-0.031
0.680	0.060	0.069	0.074	0.081	0.091	0.104	0.114	0.091	0.105
0.740	0.161	0.172	0.178	0.185	0.196	0.206	0.216	0.191	0.207
0.800	0.230	0.242	0.248	0.254	0.263	0.274	0.281	0.258	0.273
0.850	0.263	0.274	0.279	0.285	0.293	0.302	0.307	0.277	0.298
0.900	0.270	0.277	0.282	0.286	0.292	0.299	0.299	0.261	0.288
0.950	0.230	0.233	0.234	0.237	0.240	0.243	0.236	0.176	0.219
0.980	0.152	0.151	0.150	0.150	0.149	0.148	0.132	0.035	0.103

$M_\infty = 0.74$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0
C_L	0.246	0.337	0.383	0.434	0.539	0.666	0.782
C_M	-0.067	-0.068	-0.069	-0.069	-0.068	-0.076	-0.102
C_D	0.0118	0.0119	0.0122	0.0125	0.0156	0.0235	0.0603

x/c	C_p						
Upper surface							
0.000	1.100	1.070	1.053	1.035	0.999	0.963	0.904
0.002	0.512	0.416	0.367	0.320	0.237	0.158	0.048
0.005	0.047	-0.071	-0.130	-0.184	-0.277	-0.363	-0.485
0.009	-0.289	-0.417	-0.476	-0.531	-0.626	-0.711	-0.831
0.013	-0.498	-0.633	-0.695	-0.751	-0.845	-0.922	-1.063
0.018	-0.658	-0.809	-0.889	-0.955	-1.035	-1.109	-1.231
0.025	-0.705	-0.851	-0.940	-0.986	-1.098	-1.204	-1.318
0.035	-0.727	-0.872	-0.967	-1.025	-1.144	-1.249	-1.365
0.050	-0.767	-0.930	-0.976	-1.045	-1.160	-1.264	-1.380
0.075	-0.757	-0.996	-1.048	-1.123	-1.211	-1.294	-1.412
0.100	-0.670	-0.896	-0.986	-1.057	-1.167	-1.260	-1.362
0.150	-0.649	-0.733	-0.939	-1.042	-1.164	-1.254	-1.356
0.200	-0.634	-0.720	-0.695	-0.997	-1.148	-1.238	-1.353
0.260	-0.622	-0.698	-0.730	-0.664	-1.142	-1.247	-1.358
0.320	-0.618	-0.684	-0.719	-0.710	-1.118	-1.253	-1.368
0.380	-0.604	-0.660	-0.687	-0.705	-0.681	-1.251	-1.358
0.440	-0.597	-0.646	-0.669	-0.690	-0.599	-1.188	-0.802
0.500	-0.570	-0.608	-0.625	-0.640	-0.604	-0.628	-0.690
0.560	-0.513	-0.542	-0.553	-0.564	-0.558	-0.507	-0.638
0.620	-0.430	-0.451	-0.459	-0.467	-0.471	-0.428	-0.578
0.680	-0.328	-0.342	-0.350	-0.356	-0.363	-0.343	-0.510
0.740	-0.226	-0.239	-0.245	-0.250	-0.258	-0.255	-0.445
0.800	-0.146	-0.157	-0.162	-0.166	-0.173	-0.174	-0.360
0.850	-0.093	-0.103	-0.106	-0.109	-0.115	-0.117	-0.293
0.900	-0.044	-0.053	-0.054	-0.057	-0.063	-0.065	-0.229
0.950	0.006	0.000	-0.003	-0.004	-0.009	-0.013	-0.170
0.980	0.039	0.034	0.031	0.030	0.026	0.020	0.140
1.000	0.051	0.044	0.045	0.044	0.035	0.024	-0.111
Lower surface							
0.002	1.049	1.082	1.095	1.107	1.125	1.135	1.144
0.005	0.795	0.859	0.887	0.915	0.961	1.000	1.044
0.010	0.491	0.575	0.614	0.651	0.716	0.770	0.841
0.017	0.241	0.329	0.373	0.415	0.488	0.551	0.635
0.025	0.074	0.163	0.207	0.250	0.325	0.392	0.478
0.050	-0.224	-0.137	-0.091	-0.048	0.028	0.096	0.185
0.100	-0.427	-0.345	-0.303	-0.262	-0.192	-0.129	-0.049
0.150	-0.515	-0.439	-0.400	-0.361	-0.295	-0.237	-0.166
0.200	-0.543	-0.474	-0.440	-0.404	-0.344	-0.292	-0.230
0.280	-0.565	-0.511	-0.481	-0.450	-0.400	-0.355	-0.308
0.330	-0.596	-0.545	-0.519	-0.489	-0.442	-0.399	-0.360
0.380	-0.702	-0.643	-0.614	-0.582	-0.534	-0.492	-0.458
0.440	-0.567	-0.538	-0.523	-0.502	-0.470	-0.441	-0.425
0.520	-0.274	-0.257	-0.249	-0.238	-0.219	-0.204	-0.202
0.600	-0.092	-0.081	-0.075	-0.066	-0.053	-0.044	-0.051
0.680	0.062	0.072	0.077	0.084	0.093	0.102	0.089
0.740	0.162	0.173	0.179	0.187	0.196	0.204	0.192
0.800	0.232	0.244	0.249	0.256	0.266	0.273	0.259
0.850	0.266	0.276	0.281	0.288	0.295	0.301	0.281
0.900	0.274	0.281	0.284	0.289	0.296	0.299	0.269
0.950	0.234	0.237	0.238	0.241	0.244	0.244	0.191
0.980	0.156	0.155	0.153	0.153	0.153	0.149	0.060

Table 2 (continued)

$M_\infty = 0.75$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0
C_L	0.249	0.346	0.391	0.449	0.573	0.690	0.743
C_M	-0.068	-0.070	-0.070	-0.070	-0.074	-0.090	-0.106
C_D	0.0120	0.0121	0.0124	0.0132	0.0147	0.0240	0.0664

x/c	C_p						
Upper surface							
0.000	1.105	1.077	1.062	1.046	1.011	0.980	0.930
0.002	0.527	0.433	0.391	0.346	0.264	0.196	0.101
0.005	0.066	-0.048	-0.100	-0.151	-0.242	-0.318	-0.421
0.009	-0.266	-0.388	-0.441	-0.492	-0.585	-0.661	-0.762
0.013	-0.474	-0.601	-0.657	-0.711	-0.802	-0.875	-0.987
0.018	-0.635	-0.780	-0.845	-0.913	-0.988	-1.057	-1.165
0.025	-0.685	-0.820	-0.904	-0.946	-1.052	-1.147	-1.250
0.035	-0.711	-0.852	-0.933	-0.986	-1.100	-1.194	-1.286
0.050	-0.752	-0.907	-0.944	-1.010	-1.121	-1.210	-1.306
0.075	-0.795	-0.982	-1.029	-1.092	-1.174	-1.243	-1.347
0.100	-0.679	-0.902	-0.974	-1.037	-1.133	-1.218	-1.299
0.150	-0.659	-0.844	-0.956	-1.028	-1.141	-1.217	-1.295
0.200	-0.651	-0.698	-0.906	-1.007	-1.129	-1.202	-1.297
0.260	-0.643	-0.745	-0.693	-0.983	-1.134	-1.214	-1.306
0.320	-0.641	-0.703	-0.711	-0.849	-1.138	-1.227	-1.317
0.380	-0.628	-0.701	-0.748	-0.637	-1.085	-1.236	-1.299
0.440	-0.623	-0.681	-0.678	-0.688	-1.082	-1.202	-0.747
0.500	-0.590	-0.627	-0.642	-0.654	-0.583	-1.150	-0.651
0.560	-0.526	-0.551	-0.563	-0.572	-0.498	-0.611	-0.613
0.620	-0.438	-0.456	-0.464	-0.472	-0.436	-0.483	-0.568
0.680	-0.331	-0.345	-0.353	-0.358	-0.345	-0.378	-0.518
0.740	-0.228	-0.240	-0.246	-0.250	-0.251	-0.284	-0.469
0.800	-0.147	-0.157	-0.162	-0.166	-0.170	-0.193	-0.404
0.850	-0.094	-0.102	-0.106	-0.109	-0.113	-0.126	-0.347
0.900	-0.045	-0.051	-0.055	-0.057	-0.061	-0.070	-0.291
0.950	0.007	0.002	-0.001	-0.003	-0.007	-0.016	-0.234
0.980	0.040	0.035	0.032	0.031	0.027	0.015	-0.205
1.000	0.051	0.047	0.046	0.044	0.034	0.016	-0.164
Lower surface							
0.002	1.050	1.084	1.097	1.108	1.127	1.137	1.146
0.005	0.796	0.861	0.888	0.914	0.961	0.995	1.035
0.010	0.494	0.577	0.613	0.649	0.715	0.763	0.826
0.017	0.243	0.314	0.373	0.413	0.487	0.544	0.616
0.025	0.075	0.166	0.207	0.249	0.325	0.384	0.460
0.050	-0.225	-0.131	-0.092	-0.050	0.028	0.088	0.164
0.100	-0.434	-0.347	-0.308	-0.268	-0.194	-0.138	-0.070
0.150	-0.528	-0.444	-0.407	-0.369	-0.300	-0.248	-0.189
0.200	-0.560	-0.483	-0.450	-0.415	-0.351	-0.304	-0.255
0.280	-0.581	-0.520	-0.493	-0.463	-0.409	-0.369	-0.334
0.320	-0.617	-0.559	-0.534	-0.505	-0.455	-0.417	-0.390
0.380	-0.742	-0.674	-0.644	-0.609	-0.555	-0.516	-0.498
0.440	-0.572	-0.548	-0.535	-0.516	-0.483	-0.459	-0.460
0.520	-0.276	-0.258	-0.250	-0.240	-0.222	-0.210	-0.222
0.600	-0.094	-0.080	-0.074	-0.067	-0.053	-0.047	-0.065
0.680	0.060	0.073	0.077	0.085	0.094	0.099	0.076
0.740	0.161	0.175	0.179	0.187	0.197	0.203	0.180
0.800	0.231	0.244	0.250	0.256	0.267	0.271	0.247
0.850	0.266	0.278	0.283	0.288	0.297	0.299	0.269
0.900	0.274	0.284	0.287	0.290	0.297	0.297	0.254
0.950	0.235	0.239	0.240	0.242	0.244	0.241	0.168
0.980	0.156	0.156	0.155	0.154	0.154	0.144	0.027

$M_\infty = 0.76$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0
C_L	0.258	0.354	0.408	0.467	0.587	0.678	0.704
C_M	-0.070	-0.071	-0.072	-0.073	-0.085	-0.102	-0.109
C_D	0.0124	0.0125	0.0125	0.0131	0.0183	0.0290	0.0717

x/c	C_p						
Upper surface							
0.000	1.112	1.086	1.072	1.058	1.027	1.000	0.957
0.002	0.542	0.458	0.415	0.376	0.303	0.244	0.155
0.005	0.087	-0.016	-0.068	-0.112	-0.195	-0.262	-0.360
0.009	-0.242	-0.352	-0.405	-0.450	-0.533	-0.599	-0.694
0.013	-0.449	-0.564	-0.619	-0.665	-0.750	-0.823	-0.909
0.018	-0.611	-0.741	-0.805	-0.872	-0.927	-1.003	-1.092
0.025	-0.664	-0.781	-0.865	-0.902	-0.990	-1.079	-1.170
0.035	-0.692	-0.818	-0.899	-0.943	-1.041	-1.127	-1.213
0.050	-0.749	-0.872	-0.911	-0.967	-1.067	-1.140	-1.234
0.075	-0.809	-0.953	-1.001	-1.054	-1.122	-1.183	-1.279
0.100	-0.671	-0.885	-0.958	-1.006	-1.091	-1.165	-1.241
0.150	-0.683	-0.881	-0.947	-1.006	-1.098	-1.154	-1.240
0.200	-0.674	-0.807	-0.931	-0.994	-1.092	-1.151	-1.239
0.260	-0.684	-0.753	-0.870	-0.999	-1.102	-1.166	-1.253
0.320	-0.664	-0.708	-0.843	-0.934	-1.112	-1.182	-1.266
0.380	-0.678	-0.746	-0.815	-0.938	-1.074	-1.194	-1.252
0.440	-0.670	-0.757	-0.685	-0.961	-1.092	-1.167	-0.726
0.500	-0.615	-0.631	-0.656	-0.584	-1.139	-1.207	-0.623
0.560	-0.539	-0.558	-0.567	-0.526	-0.598	-0.649	-0.590
0.620	-0.445	-0.460	-0.466	-0.453	-0.439	-0.527	-0.559
0.680	-0.335	-0.347	-0.353	-0.350	-0.341	-0.443	-0.523
0.740	-0.230	-0.240	-0.246	-0.248	-0.253	-0.361	-0.489
0.800	-0.149	-0.157	-0.162	-0.165	-0.172	-0.271	-0.435
0.850	-0.095	-0.102	-0.105	-0.109	-0.114	-0.194	-0.386
0.900	-0.045	-0.050	-0.054	-0.056	-0.061	-0.121	-0.336
0.950	0.006	0.003	-0.000	-0.003	-0.008	-0.056	-0.287
0.980	0.040	0.036	0.033	0.031	0.024	-0.023	-0.260
1.000	0.052	0.048	0.047	0.041	0.031	-0.015	-0.208
Lower surface							
0.002	1.053	1.085	1.098	1.109	1.126	1.137	1.148
0.005	0.799	0.859	0.886	0.911	0.953	0.984	1.025
0.010	0.498	0.575	0.612	0.646	0.704	0.749	0.809
0.017	0.247	0.331	0.373	0.409	0.474	0.526	0.597
0.025	0.080	0.169	0.208	0.245	0.313	0.367	0.439
0.050	-0.221	-0.135	-0.092	-0.055	0.015	0.070	0.143
0.100	-0.476	-0.353	-0.311	-0.276	-0.208	-0.157	-0.092
0.150	-0.538	-0.455	-0.415	-0.381	-0.317	-0.269	-0.214
0.200	-0.575	-0.498	-0.460	-0.428	-0.369	-0.327	-0.281
0.280	-0.596	-0.539	-0.504	-0.479	-0.428	-0.394	-0.362
0.330	-0.627	-0.575	-0.547	-0.524	-0.476	-0.446	-0.422
0.380	-0.755	-0.706	-0.676	-0.649	-0.592	-0.560	-0.548
0.440	-0.613	-0.548	-0.540	-0.530	-0.503	-0.490	-0.500
0.520	-0.271	-0.258	-0.251	-0.243	-0.229	-0.224	-0.242
0.600	-0.091	-0.079	-0.073	-0.069	-0.058	-0.057	-0.081
0.630	0.061	0.073	0.079	0.084	0.092	0.090	0.064
0.740	0.161	0.175	0.181	0.186	0.194	0.193	0.169
0.800	0.232	0.245	0.250	0.256	0.264	0.263	0.236
0.850	0.267	0.279	0.283	0.288	0.295	0.291	0.258
0.900	0.276	0.284	0.288	0.291	0.295	0.288	0.241
0.950	0.236	0.241	0.242	0.243	0.243	0.227	0.151
0.980	0.158	0.157	0.156	0.155	0.150	0.121	-0.002

Table 2 (continued)

$M_\infty = 0.77$

α	1.0	1.5	1.75	2.0	2.5	3.0	4.0
C_L	0.245	0.361	0.427	0.490	0.596	0.642	0.667
C_M	-0.067	-0.073	-0.077	-0.083	-0.100	-0.108	-0.110
C_D	0.0152	0.0130	0.0141	0.0132	0.0160	0.0225	0.0352

x/c	C_p						
Upper surface							
0.000	1.118	1.095	1.082	1.068	1.043	1.022	0.980
0.002	0.561	0.482	0.442	0.405	0.341	0.293	0.205
0.005	0.110	0.015	-0.034	-0.076	-0.148	-0.202	-0.300
0.009	-0.215	-0.317	-0.366	-0.409	-0.482	-0.534	-0.630
0.013	-0.421	-0.526	-0.577	-0.622	-0.696	-0.751	-0.832
0.018	-0.583	-0.701	-0.760	-0.825	-0.874	-0.935	-1.017
0.025	-0.639	-0.741	-0.823	-0.858	-0.931	-1.003	-1.102
0.035	-0.664	-0.782	-0.855	-0.901	-0.988	-1.049	-1.151
0.050	-0.738	-0.837	-0.874	-0.925	-1.013	-1.061	-1.172
0.075	-0.803	-0.917	-0.966	-1.016	-1.072	-1.120	-1.215
0.100	-0.746	-0.863	-0.928	-0.971	-1.043	-1.100	-1.177
0.150	-0.662	-0.872	-0.927	-0.977	-1.053	-1.101	-1.187
0.200	-0.686	-0.837	-0.919	-0.970	-1.051	-1.098	-1.186
0.260	-0.706	-0.801	-0.917	-0.985	-1.066	-1.115	-1.203
0.320	-0.713	-0.807	-0.867	-0.956	-1.081	-1.134	-1.218
0.380	-0.712	-0.792	-0.899	-0.941	-1.052	-1.144	-1.222
0.440	-0.727	-0.823	-0.914	-0.992	-1.071	-1.125	-0.730
0.500	-0.634	-0.835	-0.916	-0.999	-1.126	-1.166	-0.600
0.560	-0.543	-0.515	-0.542	-0.725	-0.951	-0.615	-0.571
0.620	-0.448	-0.440	-0.423	-0.424	-0.517	-0.513	-0.550
0.680	-0.336	-0.338	-0.332	-0.326	-0.404	-0.453	-0.525
0.740	-0.229	-0.236	-0.237	-0.238	-0.313	-0.396	-0.499
0.800	-0.148	-0.155	-0.158	-0.161	-0.225	-0.328	-0.457
0.850	-0.094	-0.099	-0.103	-0.105	-0.155	-0.264	-0.416
0.900	-0.044	-0.048	-0.052	-0.053	-0.090	-0.198	-0.374
0.950	0.009	0.005	0.001	-0.001	-0.029	-0.132	-0.330
0.980	0.042	0.038	0.034	0.032	0.004	-0.097	-0.304
1.000	0.052	0.048	0.046	0.040	0.012	-0.077	-0.248
Lower surface							
0.002	1.056	1.086	1.099	1.109	1.126	1.136	1.150
0.005	0.801	0.858	-0.885	0.908	0.947	0.973	1.016
0.010	0.501	0.574	0.610	0.642	0.693	0.732	0.795
0.017	0.251	0.330	0.370	0.407	0.464	0.508	0.579
0.025	0.084	0.165	0.206	0.243	0.302	0.346	0.421
0.050	-0.218	-0.135	-0.095	-0.057	0.004	0.049	0.124
0.100	-0.438	-0.357	-0.318	-0.280	-0.222	-0.181	-0.113
0.150	-0.548	-0.465	-0.426	-0.389	-0.334	-0.296	-0.237
0.200	-0.592	-0.511	-0.475	-0.440	-0.389	-0.355	-0.306
0.280	-0.612	-0.548	-0.519	-0.491	-0.450	-0.425	-0.390
0.330	-0.636	-0.585	-0.559	-0.536	-0.501	-0.480	-0.454
0.380	-0.764	-0.717	-0.695	-0.671	-0.635	-0.618	-0.600
0.440	-0.916	-0.689	-0.586	-0.532	-0.519	-0.520	-0.533
0.520	-0.266	-0.253	-0.248	-0.242	-0.237	-0.241	-0.260
0.600	-0.091	-0.077	-0.073	-0.067	-0.064	-0.071	-0.094
0.680	0.060	0.073	0.079	0.084	0.086	0.077	0.053
0.740	0.158	0.174	0.180	0.186	0.189	0.181	0.157
0.800	0.231	0.245	0.250	0.256	0.259	0.250	0.225
0.850	0.267	0.279	0.284	0.289	0.289	0.278	0.247
0.900	0.277	0.286	0.289	0.292	0.289	0.272	0.230
0.950	0.237	0.242	0.243	0.243	0.235	0.202	0.134
0.980	0.159	0.159	0.157	0.155	0.137	0.082	-0.027

$M_\infty = 0.78$

α	1.0	1.5	1.75	2.0	2.5	3.0
C_L	0.251	0.364	0.427	0.478	0.561	0.586
C_M	-0.069	-0.077	-0.084	-0.092	-0.105	-0.106
C_D		0.0164	0.0182	0.0215	0.0269	0.0357

x/c	C_p					
Upper surface						
0.000	1.125	1.104	1.092	1.081	1.060	1.041
0.002	0.578	0.506	0.469	0.439	0.384	0.337
0.005	0.134	0.047	0.003	-0.031	-0.095	-0.147
0.009	-0.188	-0.280	-0.324	-0.361	-0.425	-0.477
0.013	-0.392	-0.488	-0.533	-0.570	-0.638	-0.689
0.018	-0.554	-0.659	-0.711	-0.765	-0.823	-0.863
0.025	-0.610	-0.701	-0.776	-0.810	-0.869	-0.930
0.035	-0.637	-0.745	-0.805	-0.854	-0.925	-0.980
0.050	-0.717	-0.801	-0.833	-0.869	-0.955	-1.003
0.075	-0.780	-0.884	-0.926	-0.968	-1.019	-1.064
0.100	-0.739	-0.835	-0.891	-0.922	-0.984	-1.035
0.150	-0.705	-0.853	-0.895	-0.935	-1.003	-1.052
0.200	-0.664	-0.841	-0.894	-0.935	-1.001	-1.049
0.260	-0.719	-0.808	-0.907	-0.953	-1.021	-1.069
0.320	-0.725	-0.824	-0.866	-0.935	-1.038	-1.093
0.380	-0.758	-0.852	-0.899	-0.924	-1.011	-1.096
0.440	-0.787	-0.841	-0.942	-0.977	-1.037	-1.088
0.500	-0.829	-0.904	-0.937	-1.015	-1.094	-1.132
0.560	-0.569	-0.917	-1.001	-1.033	-1.065	-0.600
0.620	-0.417	-0.421	-0.490	-0.548	-0.530	-0.496
0.680	-0.323	-0.313	-0.334	-0.373	-0.427	-0.448
0.740	-0.224	-0.225	-0.240	-0.277	-0.352	-0.404
0.800	-0.146	-0.149	-0.161	-0.191	-0.275	-0.350
0.850	-0.093	-0.096	-0.103	-0.126	-0.209	-0.299
0.900	-0.043	-0.046	-0.051	-0.067	-0.142	-0.245
0.950	0.008	0.005	0.001	-0.010	-0.076	-0.187
0.980	0.042	0.039	0.033	0.022	-0.040	-0.154
1.000	0.052	0.047	0.042	0.029	-0.025	-0.126
Lower surface						
0.002	1.055	1.084	1.098	1.107	1.123	1.134
0.005	0.800	0.855	0.881	0.900	0.935	0.962
0.010	0.502	0.571	0 605	0.631	0.678	0.715
0.017	0.254	0.327	0.367	0.394	0.447	0.489
0.025	0.088	0.163	0.202	0.231	0.285	0.328
0.050	-0.214	-0.138	-0.099	-0.069	-0.014	0.030
0.100	-0.438	-0.362	-0.324	-0.296	-0.243	-0.203
0.150	-0.554	-0.475	-0.437	-0.409	-0.359	-0.322
0.200	-0.611	-0.528	-0.490	-0.463	-0.417	-0.384
0.280	-0.640	-0.565	-0.534	-0.513	-0.477	-0.453
0.330	-0.637	-0.595	-0.572	-0.555	-0.526	-0.509
0.380	-0.763	-0.726	-0.705	-0.690	-0.666	-0.652
0.440	-0.990	-0.937	-0.893	-0.843	-0.775	-0.802
0.520	-0.273	-0.251	-0.244	-0.243	-0.244	-0.251
0.600	-0.094	-0.078	-0.072	-0.072	-0.074	-0.084
0.680	0.054	0.071	0.077	0.078	0.075	0.064
0.740	0.153	0.169	0.178	0.179	0.178	0.167
0.800	0.226	0.241	0.250	0.250	0.248	0.237
0.850	0.263	0.276	0.283	0.283	0.278	0.264
0.900	0.273	0.283	0.288	0.286	0.277	0.256
0.950	0.233	0.239	0.241	0.237	0.217	0.180
0.980	0.156	0.156	0.155	0.147	0.112	0.050

Table 2 (concluded)

	$M_\infty = 0.79$						$M_\infty = 0.8$			
α	1.0	1.5	1.75	2.0	2.5	3.0	1.0	1.5	1.75	2.0
C_L	0.266	0.381	0.428	0.467	0.521	0.546	0.279	0.377	0.410	0.434
C_M	-0.074	-0.089	-0.097	-0.102	-0.107	-0.106	-0.081	-0.097	-0.101	-0.103
C_D	0.0184	0.0221	0.0247	0.0285	0.0296	0.0375	0.0250	0.0287	0.0319	0.0325
x/c					C_p					
Upper surface										
0.000	1.132	1.114	1.104	1.095	1.077	1.060	1.137	1.122	1.116	1.107
0.002	0.596	0.531	0.502	0.475	0.428	0.381	0.606	0.556	0.531	0.508
0.005	0.157	0.079	0.046	0.013	-0.043	-0.094	0.175	0.114	0.082	0.057
0.009	-0.160	-0.244	-0.277	-0.312	-0.368	-0.420	-0.143	-0.211	-0.244	-0.270
0.013	-0.361	-0.449	-0.484	-0.518	-0.577	-0.629	-0.330	-0.404	-0.434	-0.460
0.018	-0.517	-0.615	-0.654	-0.705	-0.771	-0.799	-0.491	-0.563	-0.601	-0.636
0.025	-0.580	-0.659	-0.718	-0.759	-0.806	-0.861	-0.555	-0.616	-0.670	-0.711
0.035	-0.609	-0.704	-0.748	-0.800	-0.850	-0.917	-0.582	-0.654	-0.698	-0.735
0.050	-0.691	-0.765	-0.786	-0.817	-0.890	-0.947	-0.665	-0.725	-0.752	-0.768
0.075	-0.755	-0.852	-0.877	-0.914	-0.962	-1.008	-0.733	-0.813	-0.833	-0.862
0.100	-0.719	-0.803	-0.842	-0.877	-0.930	-0.983	-0.699	-0.764	-0.800	-0.832
0.150	-0.697	-0.826	-0.855	-0.897	-0.951	-1.002	-0.703	-0.792	-0.820	-0.848
0.200	-0.695	-0.823	-0.858	-0.897	-0.951	-1.003	-0.692	-0.791	-0.826	-0.854
0.260	-0.712	-0.815	-0.876	-0.915	-0.975	-1.022	-0.702	-0.791	-0.845	-0.876
0.320	-0.737	-0.822	-0.846	-0.905	-0.993	-1.048	-0.743	-0.798	-0.821	-0.863
0.380	-0.761	-0.853	-0.877	-0.900	-0.974	-1.049	-0.757	-0.832	-0.853	-0.875
0.440	-0.803	-0.876	-0.929	-0.955	-1.001	-1.048	-0.809	-0.867	-0.907	-0.926
0.500	-0.855	-0.914	-0.931	-0.998	-1.057	-1.096	-0.865	-0.897	-0.916	-0.964
0.560	-0.904	-0.975	-0.995	-1.018	-1.059	-0.621	-0.922	-0.962	-0.977	-0.993
0.620	-0.449	-0.695	-0.731	-0.658	-0.530	-0.488	-0.869	-0.917	-0.796	-0.674
0.680	-0.300	-0.367	-0.402	-0.416	-0.430	-0.445	-0.366	-0.412	-0.414	-0.414
0.740	-0.211	-0.260	-0.304	-0.335	-0.370	-0.407	-0.247	-0.317	-0.337	-0.352
0.800	-0.137	-0.173	-0.217	-0.258	-0.307	-0.364	-0.158	-0.235	-0.268	-0.292
0.850	-0.084	-0.110	-0.148	-0.191	-0.250	-0.323	-0.096	-0.167	-0.206	-0.237
0.900	-0.036	-0.053	-0.083	-0.123	-0.190	-0.278	-0.040	-0.099	-0.141	-0.177
0.950	0.015	0.002	-0.020	-0.055	-0.129	-0.230	0.015	-0.033	-0.074	-0.112
0.980	0.048	0.034	0.014	-0.018	-0.093	-0.202	0.047	0.004	-0.036	-0.075
1.000	0.058	0.040	0.024	-0.005	-0.071	-0.168	0.057	0.018	-0.017	-0.049
Lower surface										
0.002	1.061	1.087	1.097	1.107	1.121	1.133	1.063	1.087	1.096	1.104
0.005	0.806	0.855	0.875	0.895	0.925	0.954	0.809	0.852	0.871	0.886
0.010	0.509	0.572	0.598	0.623	0.664	0.702	0.515	0.569	0.593	0.612
0.017	0.261	0.330	0.359	0.386	0.432	0.474	0.267	0.327	0.353	0.374
0.025	0.096	0.165	0.196	0.222	0.270	0.313	0.104	0.163	0.190	0.211
0.050	-0.205	-0.135	-0.105	-0.077	-0.030	0.014	-0.196	-0.137	-0.110	-0.088
0.100	-0.431	-0.364	-0.334	-0.307	-0.261	-0.220	-0.423	-0.366	-0.341	-0.319
0.150	-0.554	-0.483	-0.452	-0.426	-0.381	-0.343	-0.550	-0.491	-0.465	-0.443
0.200	-0.618	-0.543	-0.511	-0.485	-0.444	-0.409	-0.619	-0.561	-0.533	-0.510
0.280	-0.664	-0.588	-0.559	-0.536	-0.503	-0.478	-0.680	-0.615	-0.589	-0.569
0.330	-0.673	-0.602	-0.583	-0.570	-0.547	-0.529	-0.697	-0.636	-0.609	-0.590
0.380	-0.769	-0.730	-0.714	-0.704	-0.685	-0.671	-0.792	-0.738	-0.720	-0.712
0.440	-0.982	-0.959	-0.946	-0.936	-0.921	-0.911	-0.992	-0.956	-0.949	-0.943
0.520	-0.288	-0.265	-0.256	-0.252	-0.254	-0.262	-0.320	-0.308	-0.305	-0.308
0.600	-0.100	-0.083	-0.078	-0.078	-0.083	-0.094	-0.144	-0.114	-0.106	-0.106
0.680	0.049	0.065	0.069	0.070	0.064	0.053	0.007	0.039	0.046	0.045
0.740	0.147	0.166	0.169	0.170	0.165	0.155	0.108	0.141	0.147	0.148
0.800	0.224	0.240	0.243	0.243	0.237	0.225	0.194	0.220	0.225	0.224
0.850	0.265	0.277	0.278	0.276	0.267	0.253	0.241	0.257	0.261	0.259
0.900	0.277	0.283	0.282	0.278	0.263	0.242	0.259	0.266	0.266	0.259
0.950	0.239	0.238	0.233	0.223	0.198	0.162	0.231	0.222	0.213	0.201
0.980	0.164	0.154	0.143	0.125	0.082	0.023	0.161	0.137	0.117	0.096

	$M_\infty = 0.81$			$M_\infty = 0.82$	
α	1.0	1.5	1.75	1.0	1.5
C_L	0.226	0.318	0.348	0.179	0.228
C_M	-0.062	-0.082	-0.087	-0.042	-0.048
C_D	0.0357	0.0383	0.0398	0.0490	0.0494
x/c			C_p		
Upper surface					
0.000	1.146	1.133	1.126	1.152	1.141
0.002	0.635	0.584	0.561	0.654	0.610
0.005	0.210	0.149	0.122	0.237	0.181
0.009	-0.104	-0.171	-0.199	-0.073	-0.133
0.013	-0.293	-0.362	-0.386	-0.260	-0.321
0.018	-0.447	-0.519	-0.548	-0.412	-0.477
0.025	-0.510	-0.574	-0.608	-0.475	-0.539
0.035	-0.541	-0.609	-0.648	-0.509	-0.563
0.050	-0.625	-0.686	-0.705	-0.591	-0.648
0.075	-0.694	-0.772	-0.787	-0.661	-0.735
0.100	-0.665	-0.726	-0.755	-0.635	-0.688
0.150	-0.669	-0.756	-0.779	-0.644	-0.719
0.200	-0.666	-0.756	-0.787	-0.645	-0.721
0.260	-0.683	-0.763	-0.806	-0.665	-0.734
0.320	-0.717	-0.772	-0.794	-0.699	-0.746
0.380	-0.745	-0.809	-0.827	-0.730	-0.784
0.440	-0.790	-0.846	-0.878	-0.768	-0.822
0.500	-0.846	-0.874	-0.893	-0.827	-0.850
0.560	-0.905	-0.940	-0.952	-0.886	-0.915
0.620	-0.947	-0.887	-0.742	-0.933	-0.752
0.680	-0.405	-0.401	-0.398	-0.402	-0.370
0.740	-0.288	-0.326	-0.339	-0.304	-0.312
0.800	-0.200	-0.263	-0.287	-0.235	-0.261
0.850	-0.128	-0.206	-0.236	-0.174	-0.216
0.900	-0.059	-0.145	-0.183	-0.109	-0.164
0.950	0.007	-0.079	-0.121	-0.042	-0.106
0.980	0.044	-0.041	-0.086	-0.002	-0.071
1.000	0.058	-0.016	-0.055	0.017	-0.040
Lower surface					
0.002	1.064	1.086	1.094	1.065	1.086
0.005	0.809	0.848	0.865	0.810	0.845
0.010	0.515	0.564	0.586	0.518	0.561
0.017	0.270	0.322	0.346	0.274	0.321
0.025	0.107	0.160	0.184	0.113	0.160
0.050	-0.192	-0.139	-0.115	-0.184	-0.138
0.100	-0.418	-0.369	-0.346	-0.409	-0.367
0.150	-0.550	-0.499	-0.474	-0.544	-0.500
0.200	-0.622	-0.572	-0.549	-0.618	-0.576
0.280	-0.694	-0.642	-0.617	-0.695	-0.654
0.330	-0.720	-0.667	-0.643	-0.726	-0.685
0.380	-0.817	-0.768	-0.750	-0.824	-0.786
0.440	-0.993	-0.974	-0.959	-0.875	-0.984
0.520	-0.333	-0.342	-0.350	-0.356	-0.365
0.600	-0.233	-0.206	-0.198	-0.300	-0.294
0.680	-0.131	-0.078	-0.059	-0.238	-0.219
0.740	-0.050	0.019	0.043	-0.183	-0.156
0.800	0.040	0.115	0.138	-0.114	-0.076
0.850	0.107	0.175	0.193	-0.054	-0.008
0.900	0.158	0.205	0.215	0.010	0.054
0.950	0.174	0.184	0.179	0.062	0.085
0.980	0.142	0.111	0.090	0.067	0.059

SYMBOLS

P	static pressure
H_0	stagnation pressure in the undisturbed free stream
M_L	local Mach number on the surface
M_∞	free stream Mach number
C_L	lift coefficient
C_D	drag coefficient
C_M	pitching moment coefficient about the $\frac{1}{4}$ chord point
C_P	pressure coefficient
C_{PTE}	trailing edge pressure coefficient
α	angle of incidence, degrees
c	aerofoil chord
t	aerofoil thickness
x,y	aerofoil coordinates
x_R	extent of rooftop

REFERENCES

No.	Author	Title, etc.
1	G.Y. Nieuwland	Theoretical design of shock-free, transonic flow around aerofoil sections. ICAS Paper No.66-26 5th International Congress, London, 12-16 September (1966)
2	F. Bauer P.R. Garabedian D. Korn	Supercritical wing sections Lecture Notes in Economics and Mathematical Systems, No.66, Springer-Verlag (Berlin)(1972)
3	J.A. Krupp E.M. Murman	The numerical calculation of steady transonic flows past thin lifting aerofoils and slender bodies. AIAA Paper No.71-566
4		A method for predicting the pressure distribution on swept wings with subsonic attached flow. Royal Aeronautical Society Transonic Data Memorandum 7312 (1973)
5	R.C. Lock B.J. Powell C.C.L. Sells P.G. Wilby	The prediction of aerofoil pressure distributions for sub-critical viscous flows. AGARD CP 35, Paper 13 (1968)
6	D.J. Hall V.G. Quincey R.C Lock	Some results of wind tunnel tests on an aerofoil section (NPL 9510) combining a 'peaky' upper surface pressure distribution with rear loading. ARC Current Paper 1292 (1969)
7	J. Osborne	Unpublished RAE data (1972)
8	G.S. Smith K.G. Moreton	Experience in the use of pressure transducers and scanning switches for accurate measurement of steady pressures. NPL Aero Note 1073 (1968)

REFERENCES (concluded)

No.	Author	Title, etc.
9	B.M. Spee	Investigations on the transonic flow around aerofoils NLR Technical Report 69122U (1970)
10	H.H. Pearcey	The aerodynamic design of section shapes for swept wings. Advances in aeronautical sciences, Vols.3-4, Pergamon Press Ltd., pp.277-321 (1961)
11		Drag-rise Mach number of aerofoils having a specified form of upper-surface pressure distribution: Charts and comments on design. Royal Aeronautical Society Transonic Data Memorandum 71019 (1971)
12	J.J. Kacprzynski L.H. Ohman P.R. Garabedian D.G. Korn	Analysis of the flow past a shockless lifting aerofoil in design and off-design conditions. NRC/NAE LR-554 (1971)
13	J.E. Green D.J. Weeks J.W.F. Brooman	Prediction of turbulent boundary layers and wakes in compressible flow by a lag-entrainment method. RAE Technical Report 72231 - ARC 34458 (1972)

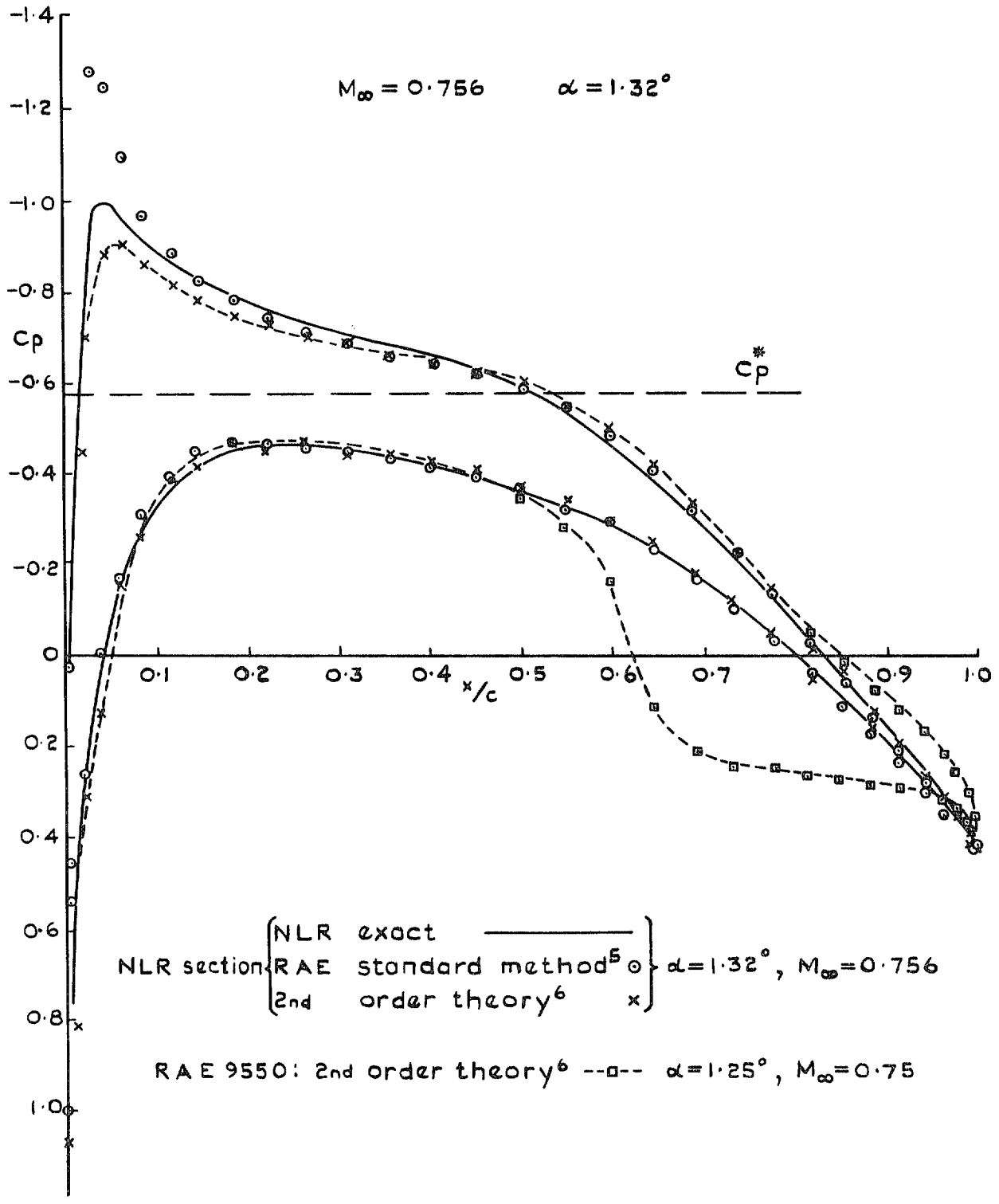


Fig 1 Theoretical pressure distributions for original and modified aerofoils

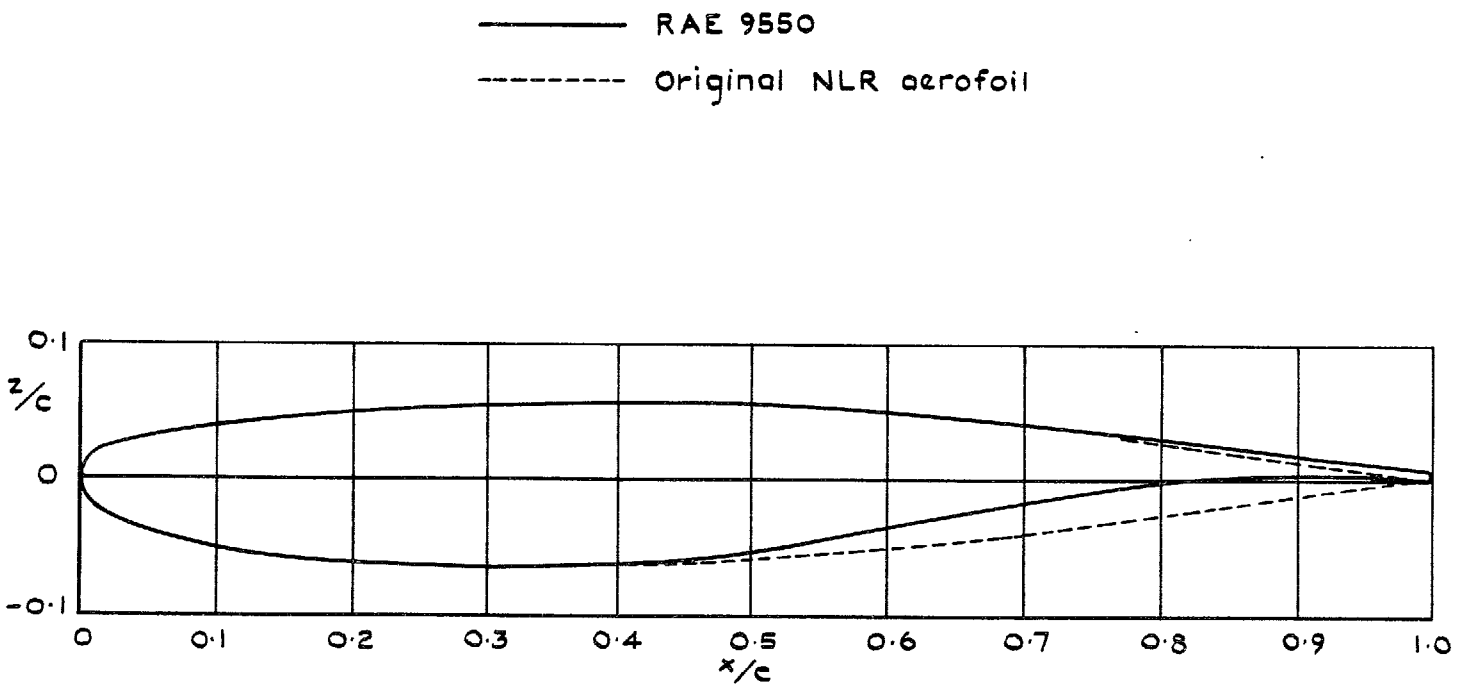


Fig 2 Aerofoil section RAE 9550

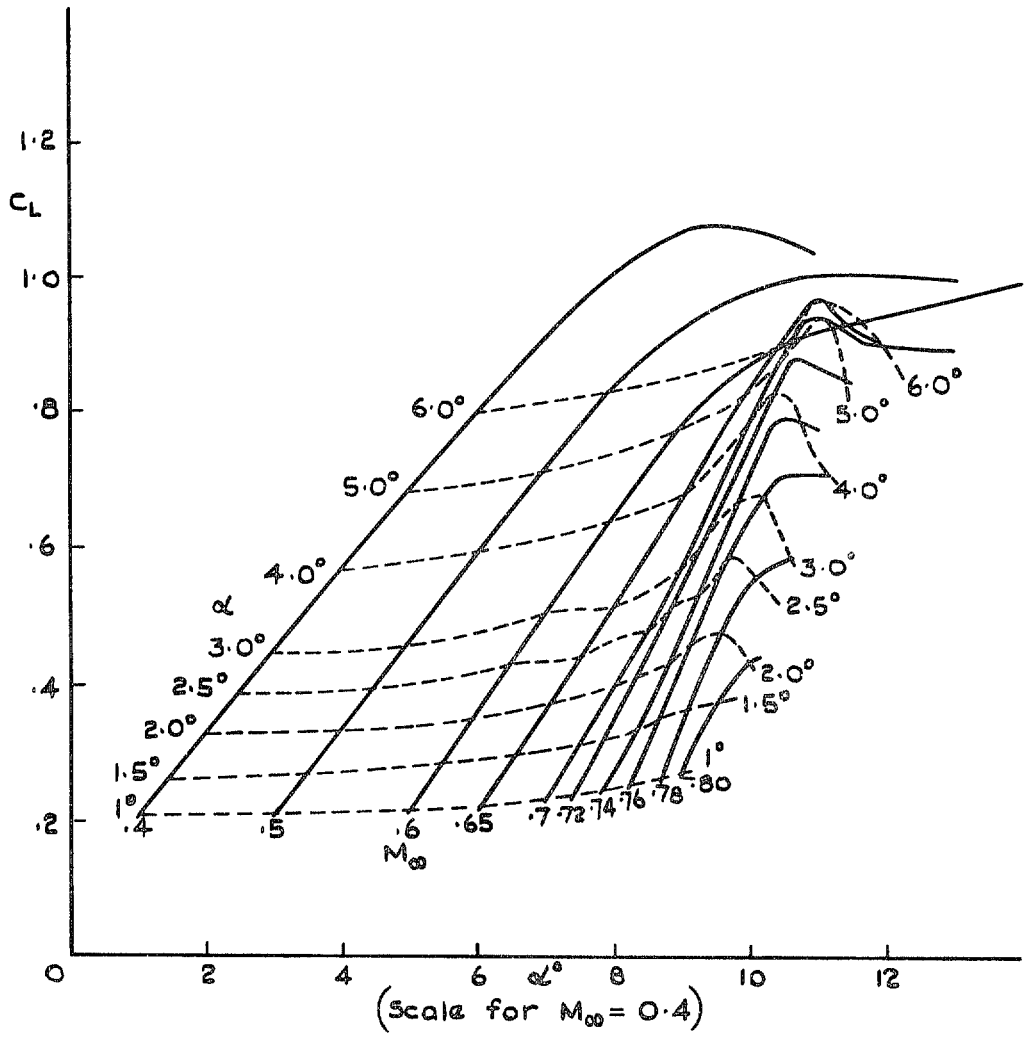


Fig 3 Variation of lift coefficient with incidence and Mach number

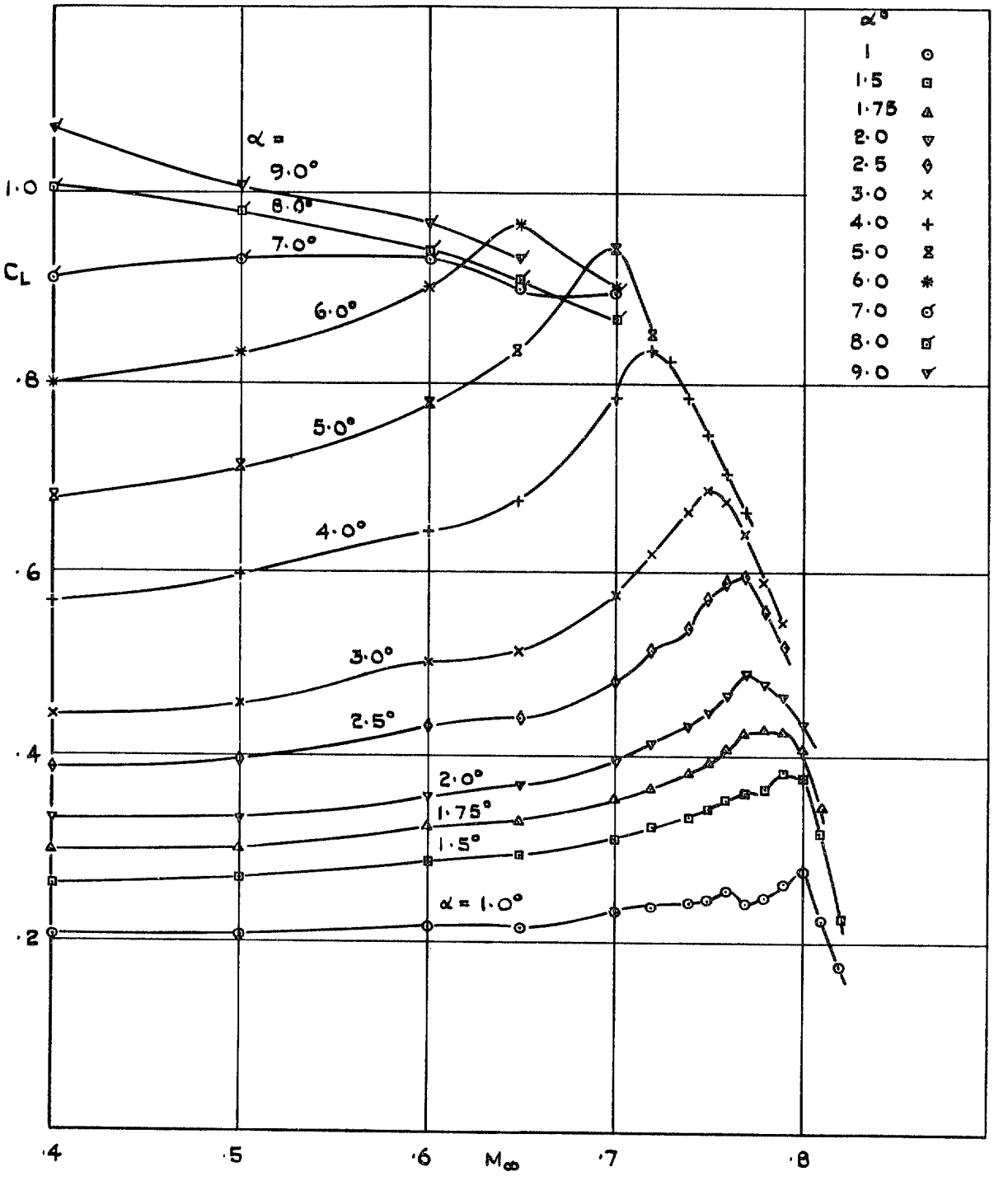


Fig 4 Variation of lift coefficient with Mach number

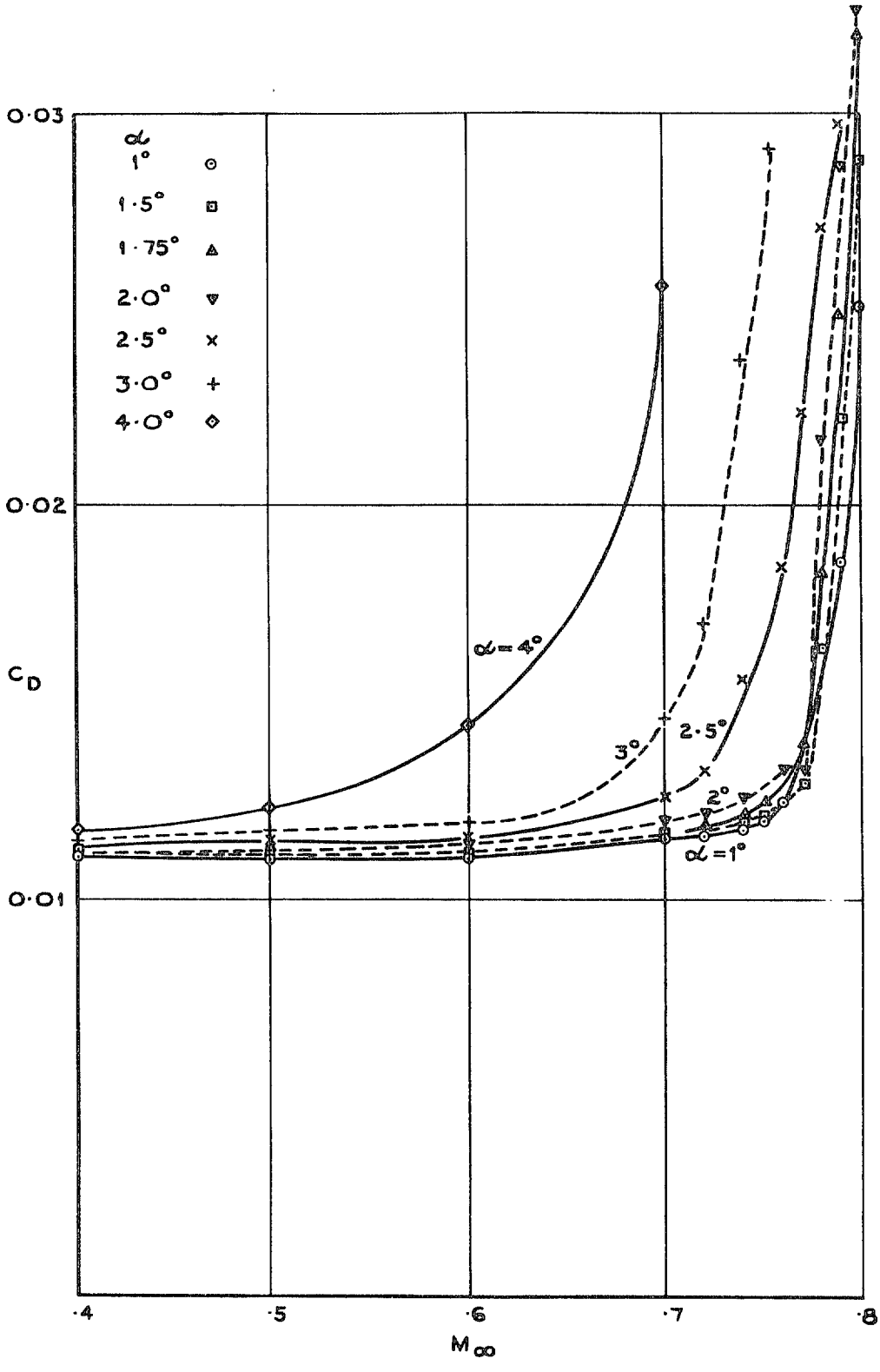


Fig 5 Variation of drag coefficient with Mach number

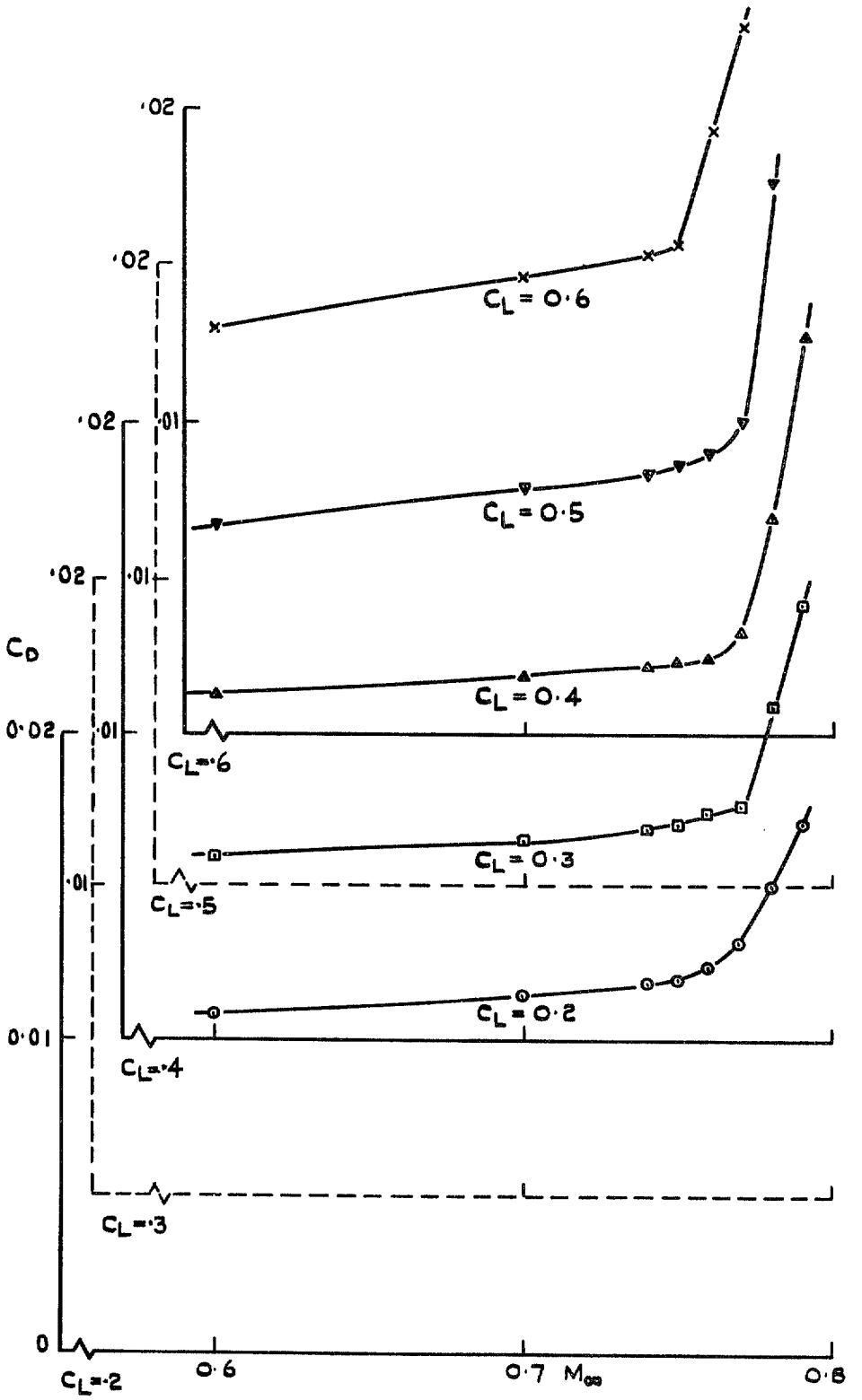


Fig 6 Drag at constant lift coefficient

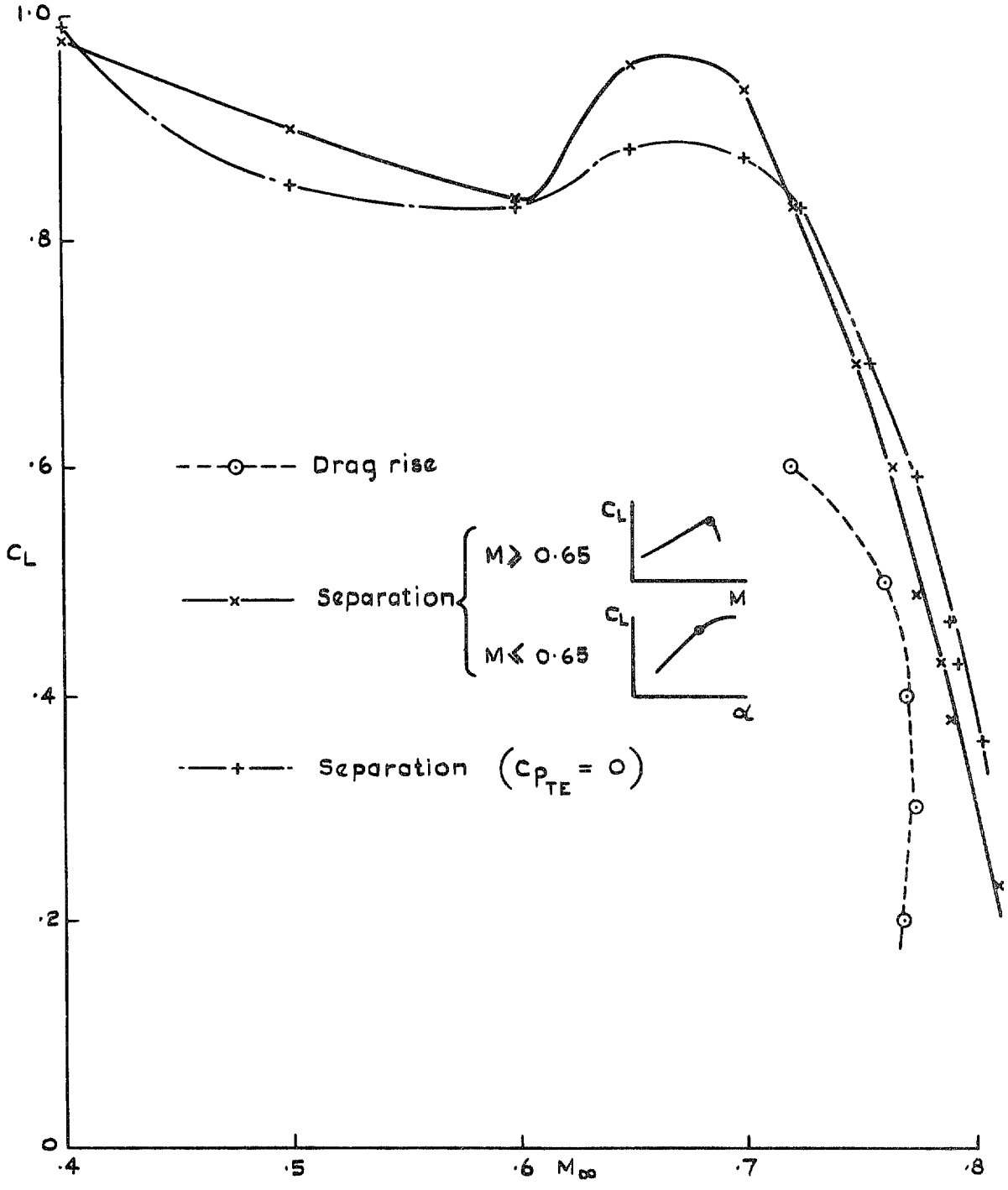


Fig 7 Drag rise and separation (buffet) boundaries

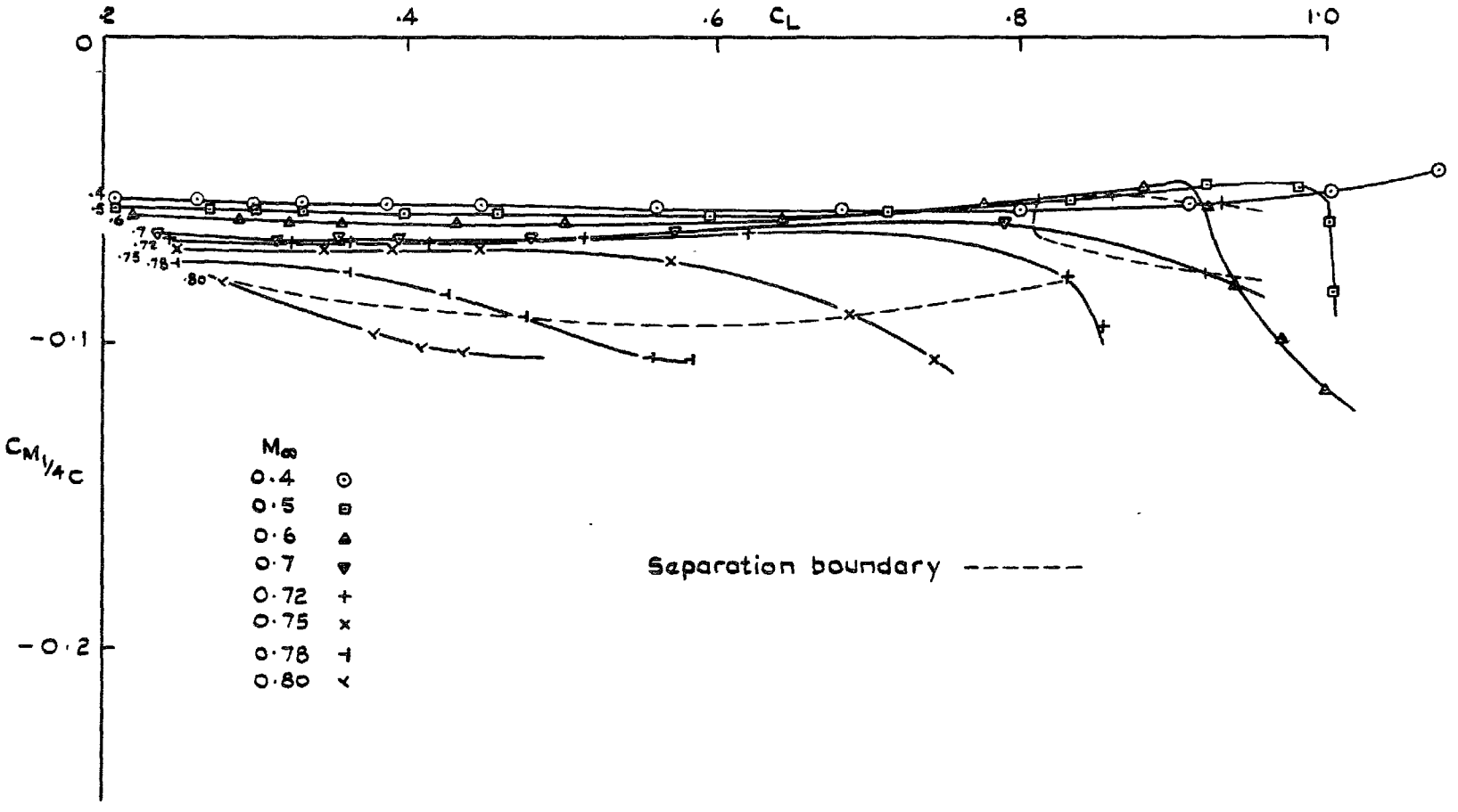


Fig 8 Variation of pitching moment coefficient with lift coefficient and Mach number

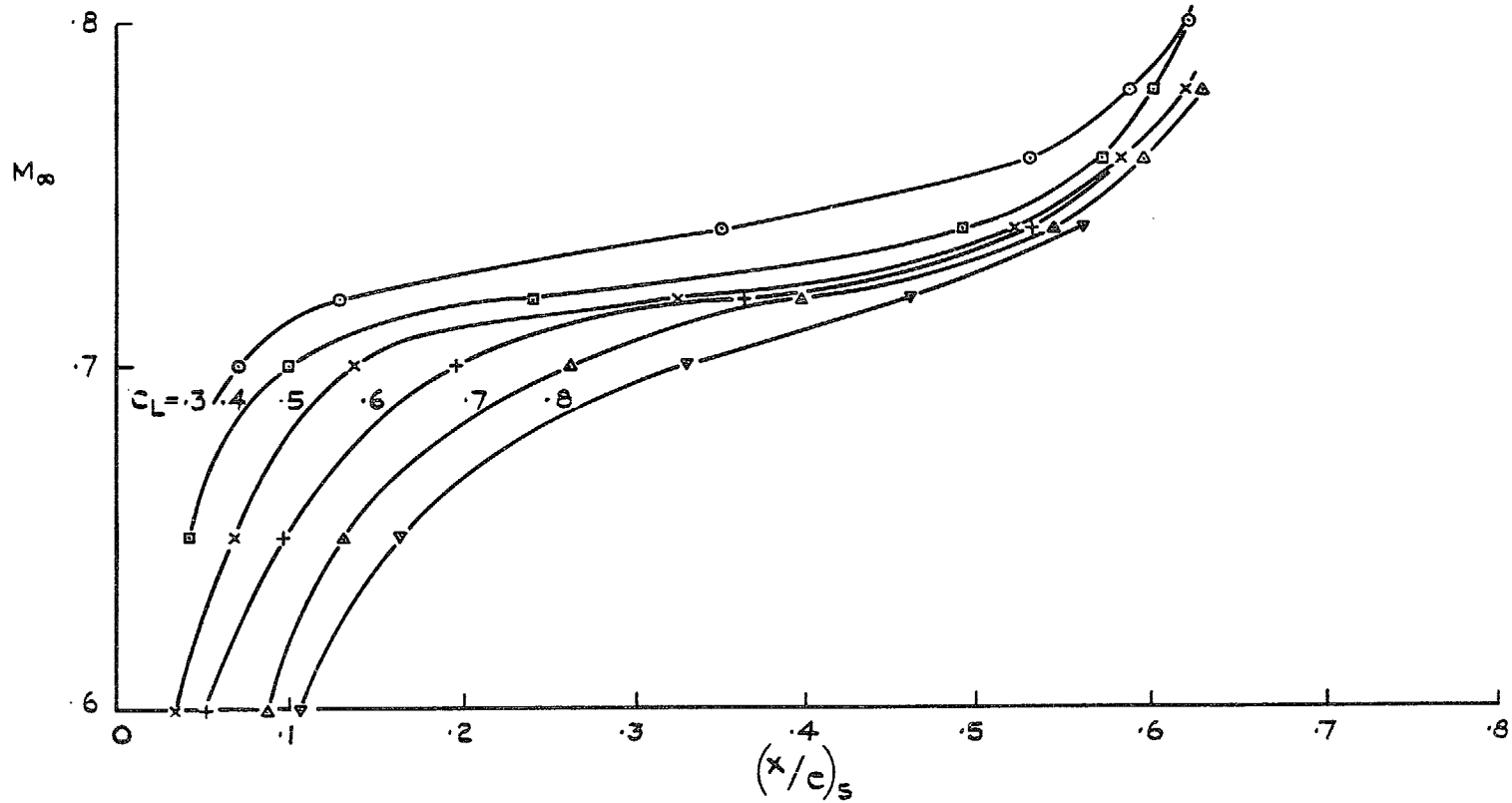


Fig 9 Variation in position of U/S shock with M_∞ at constant C_L

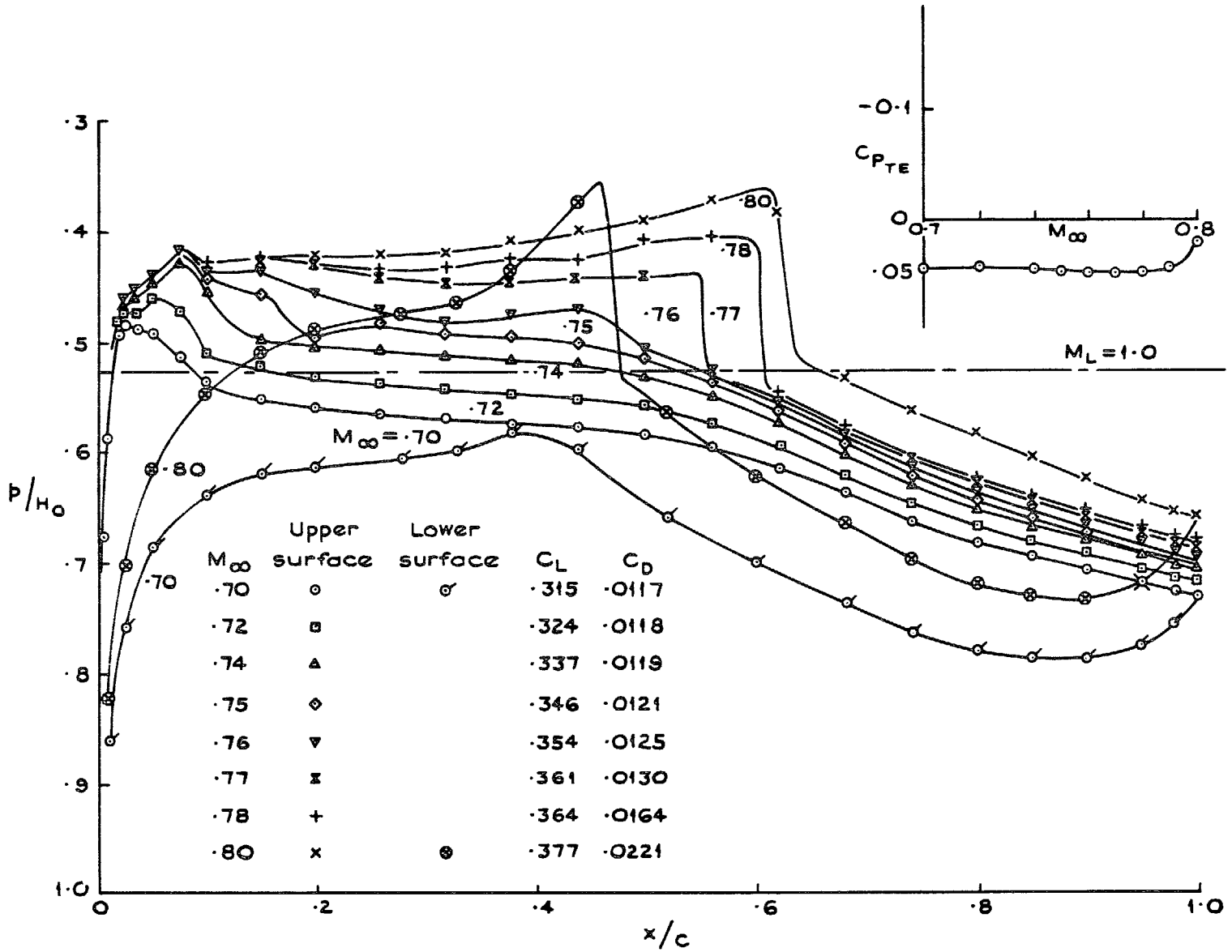
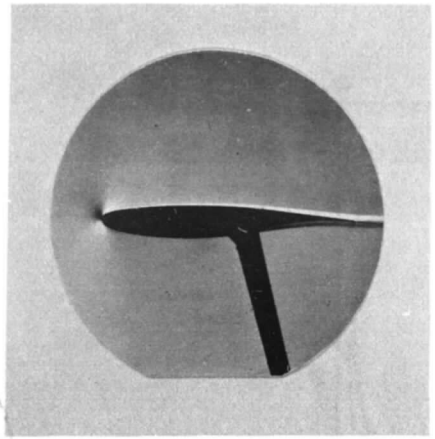
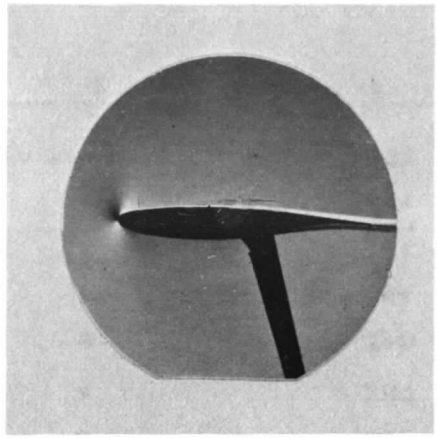


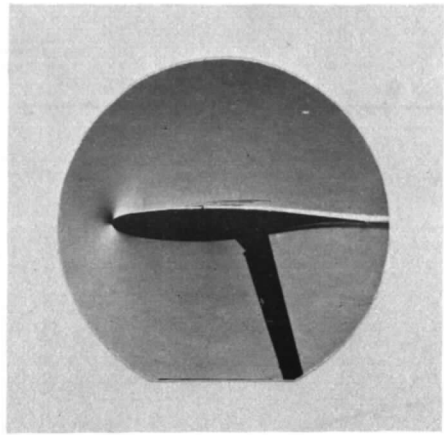
Fig 10 Pressure distributions $\alpha = 1.5^\circ$



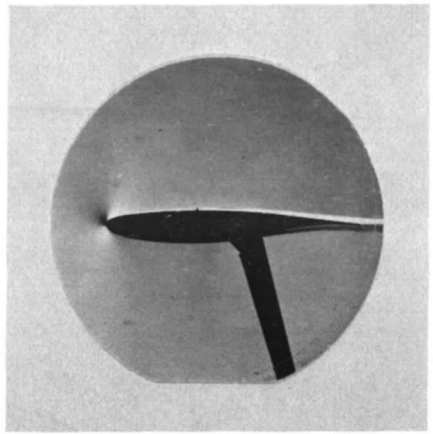
M_∞ = 0.70



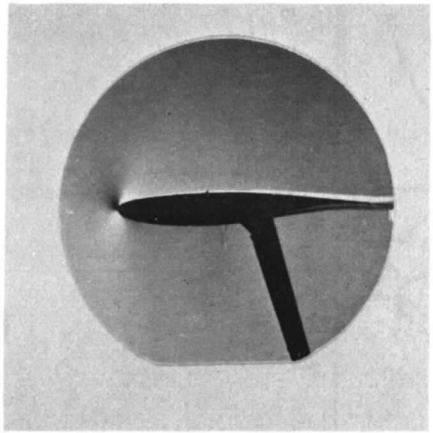
0.72



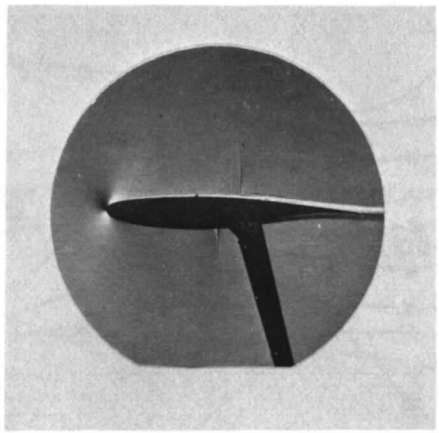
0.74



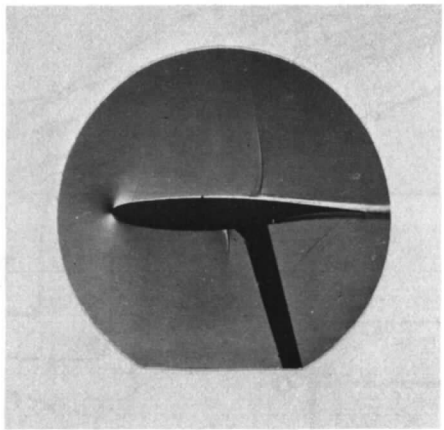
0.75



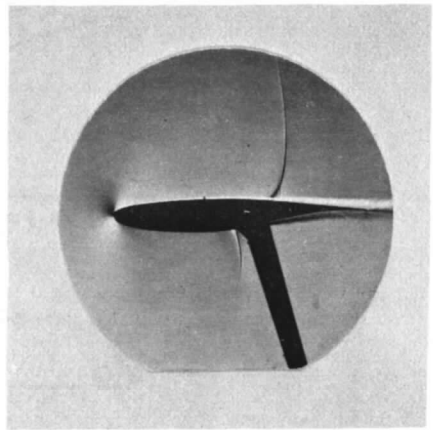
M_∞ = 0.76



0.77



0.78



0.80

Fig.11 Schlieren photographs, α = 1.5°

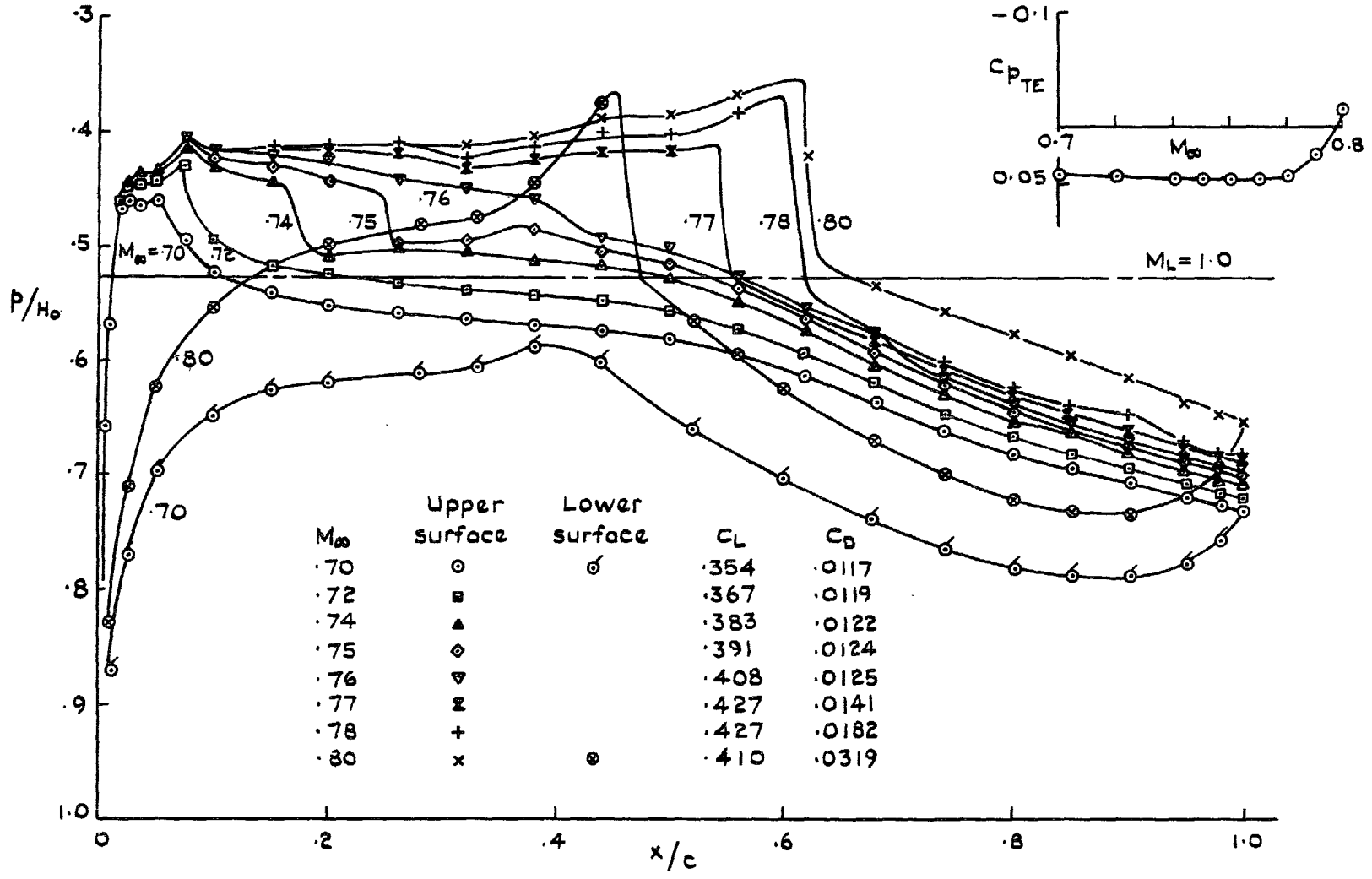
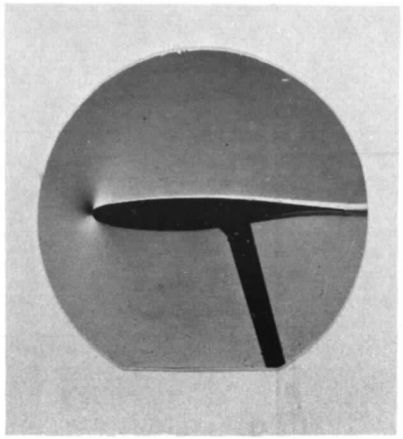
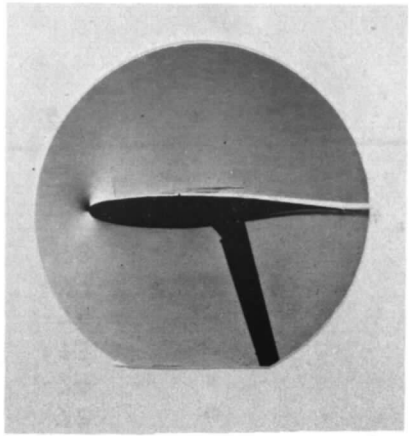


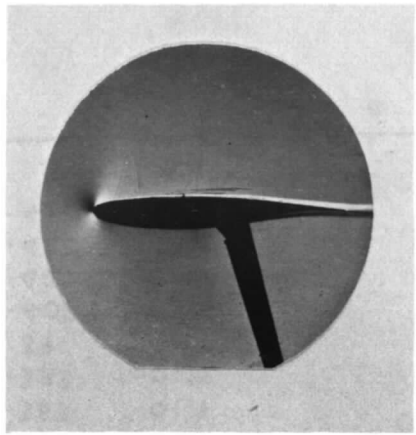
Fig 12 Pressure distributions $\alpha = 1.75^\circ$



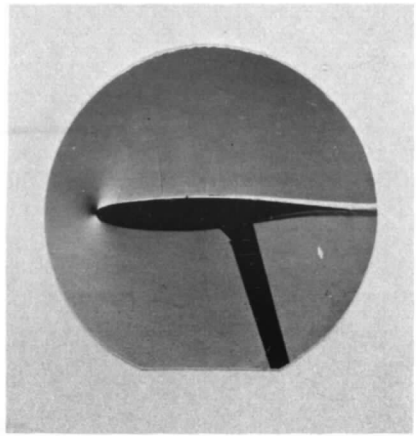
M_∞ = 0.70



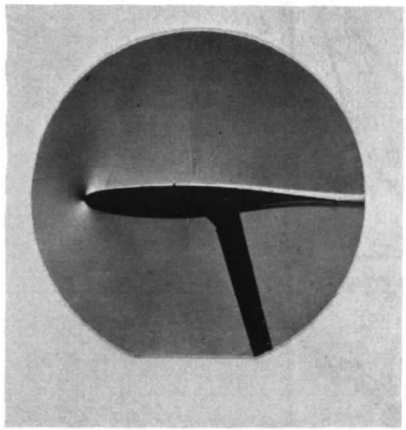
0.72



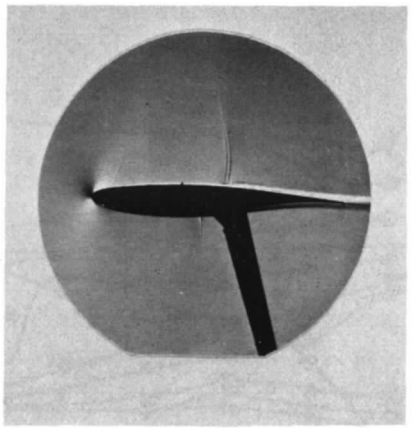
0.74



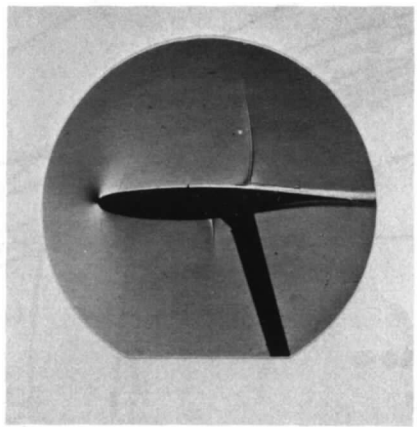
0.75



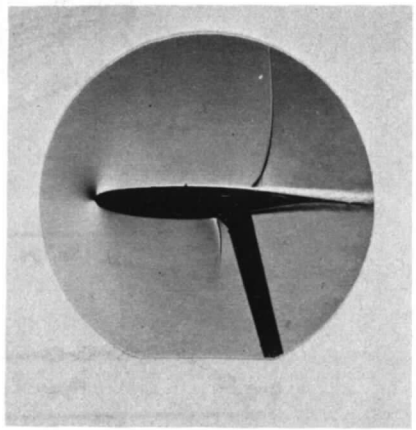
M_∞ = 0.76



0.77



0.78



0.80

Fig.13 Schlieren photographs, α = 1.75°

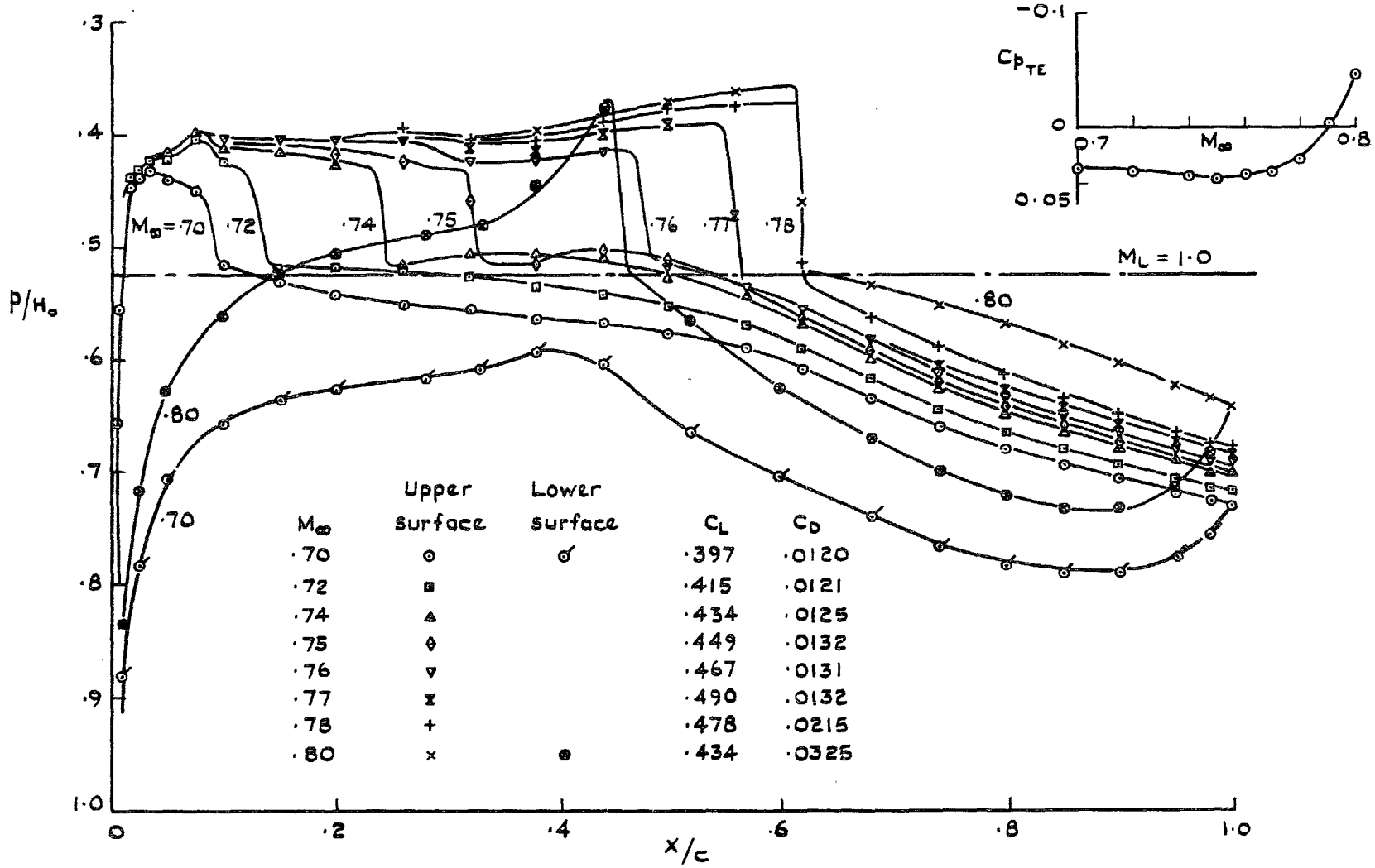
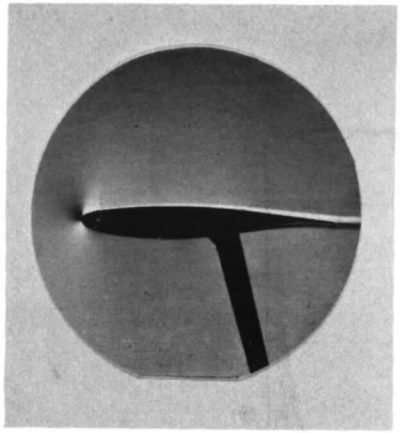
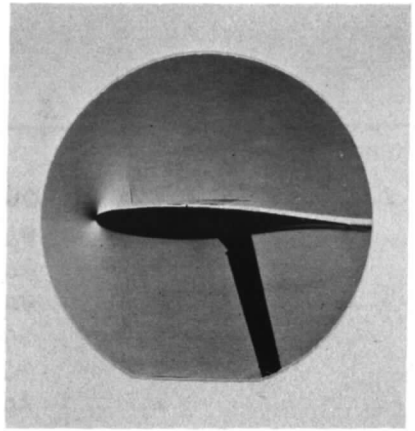


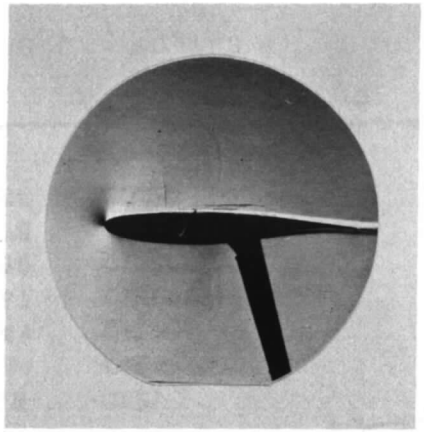
Fig 14 Pressure distributions $\alpha = 2°$



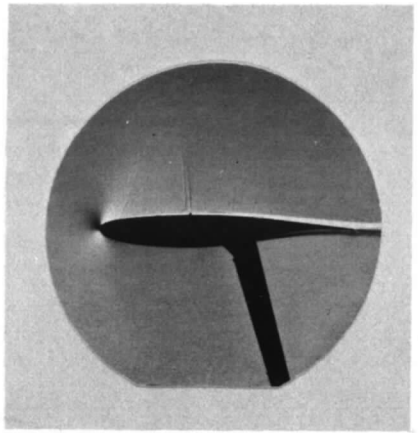
M_∞ = 0.70



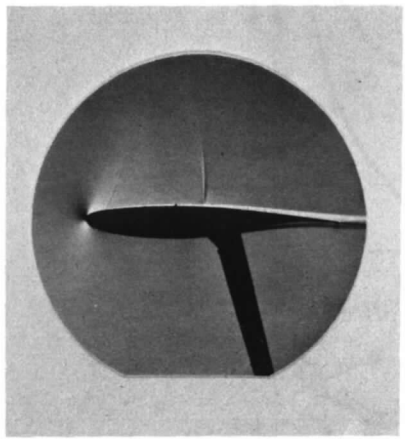
0.72



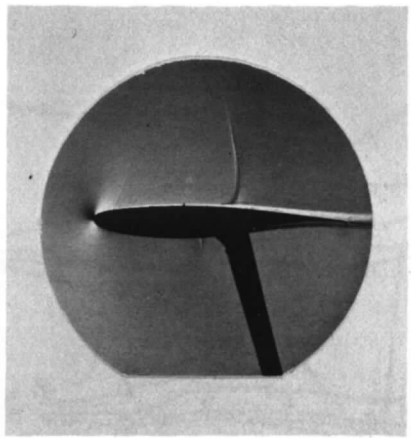
0.74



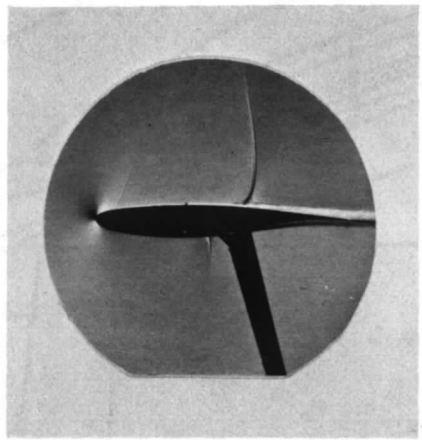
0.75



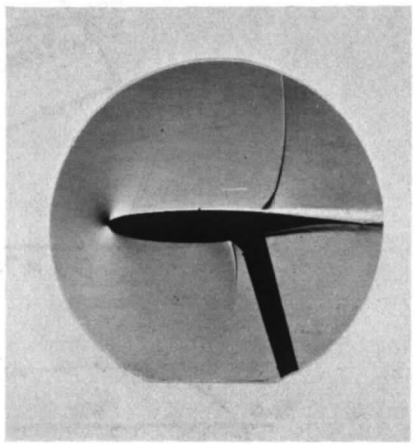
M_∞ = 0.76



0.77



0.78



0.80

Fig.15 Schlieren photographs, α = 2.0°

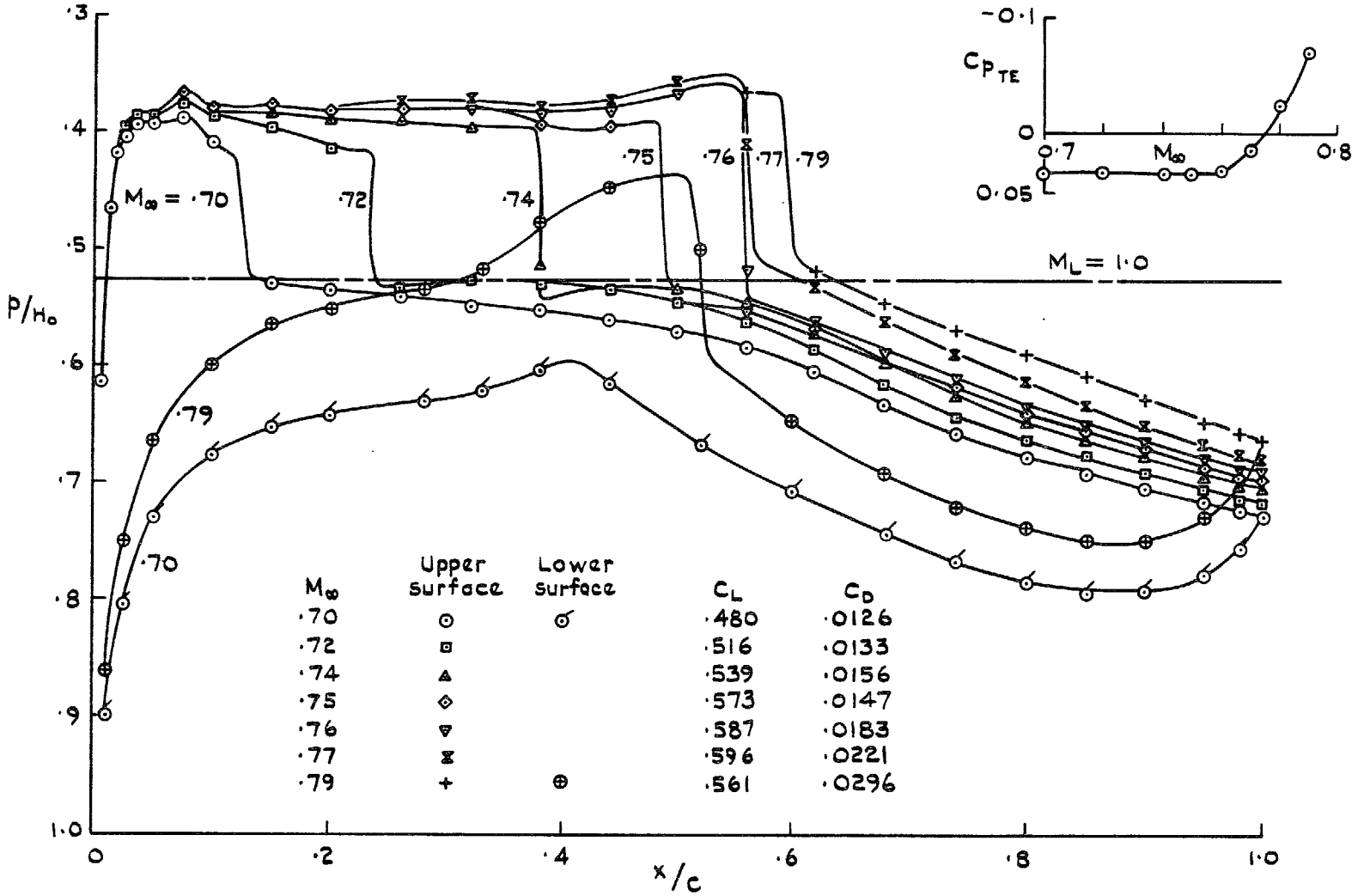
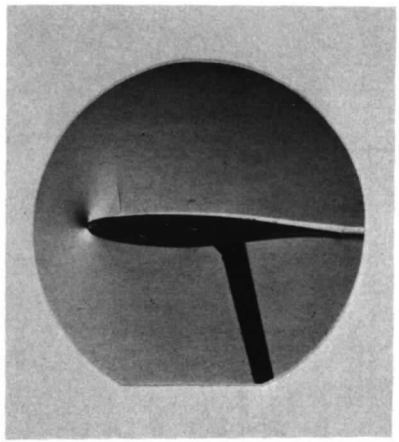
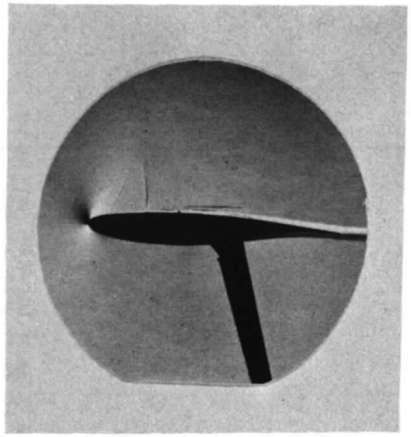


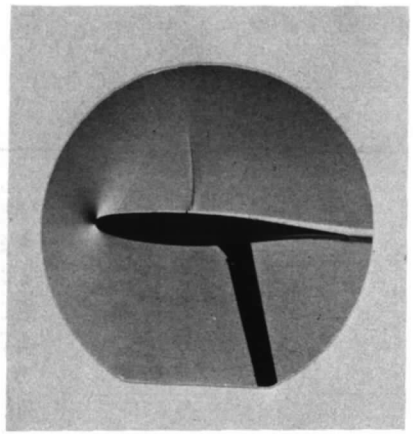
Fig 16 Pressure distributions $\alpha = 2.5°$



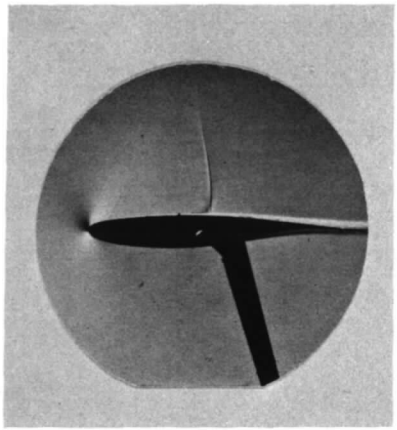
M_∞ = 0.70



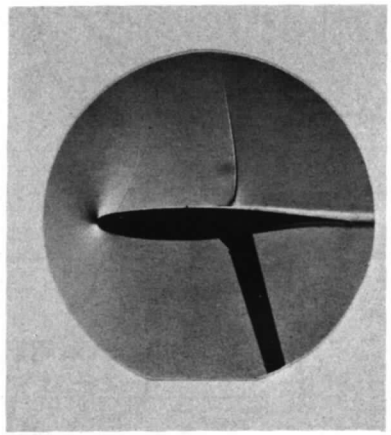
0.72



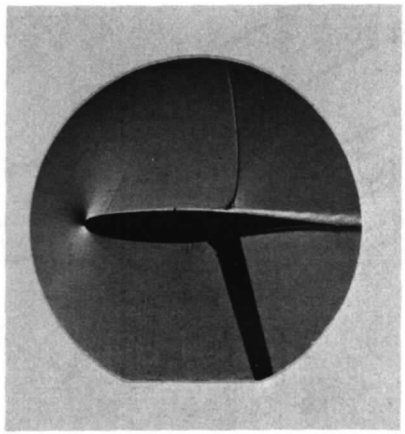
0.74



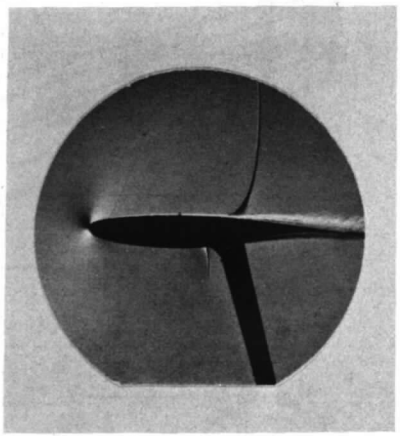
0.75



M_∞ = 0.76



0.77



0.79

Fig.17 Schlieren photographs, α = 2.5°

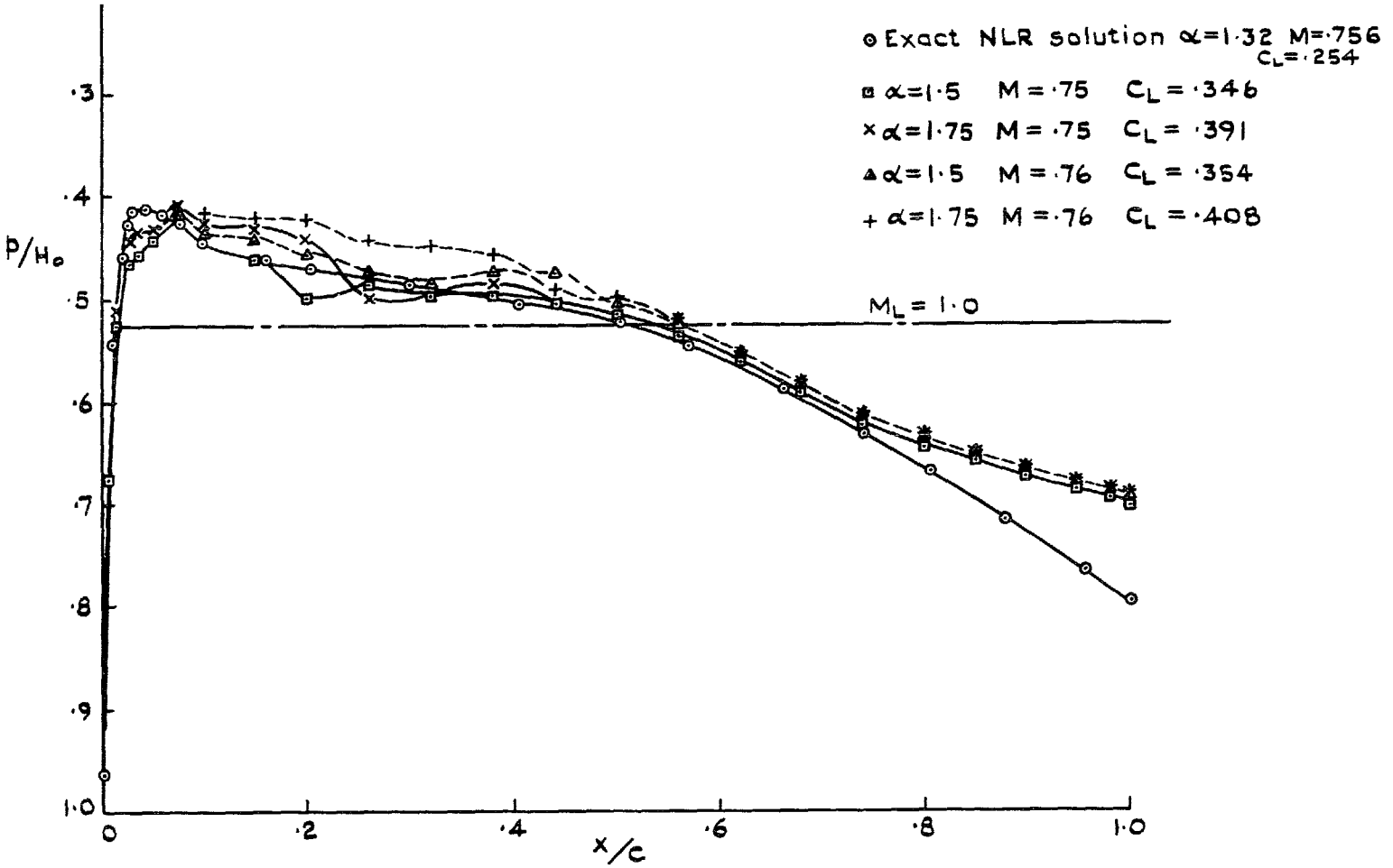


Fig 18 Comparison of experimental upper surface pressure distributions with original NLR section

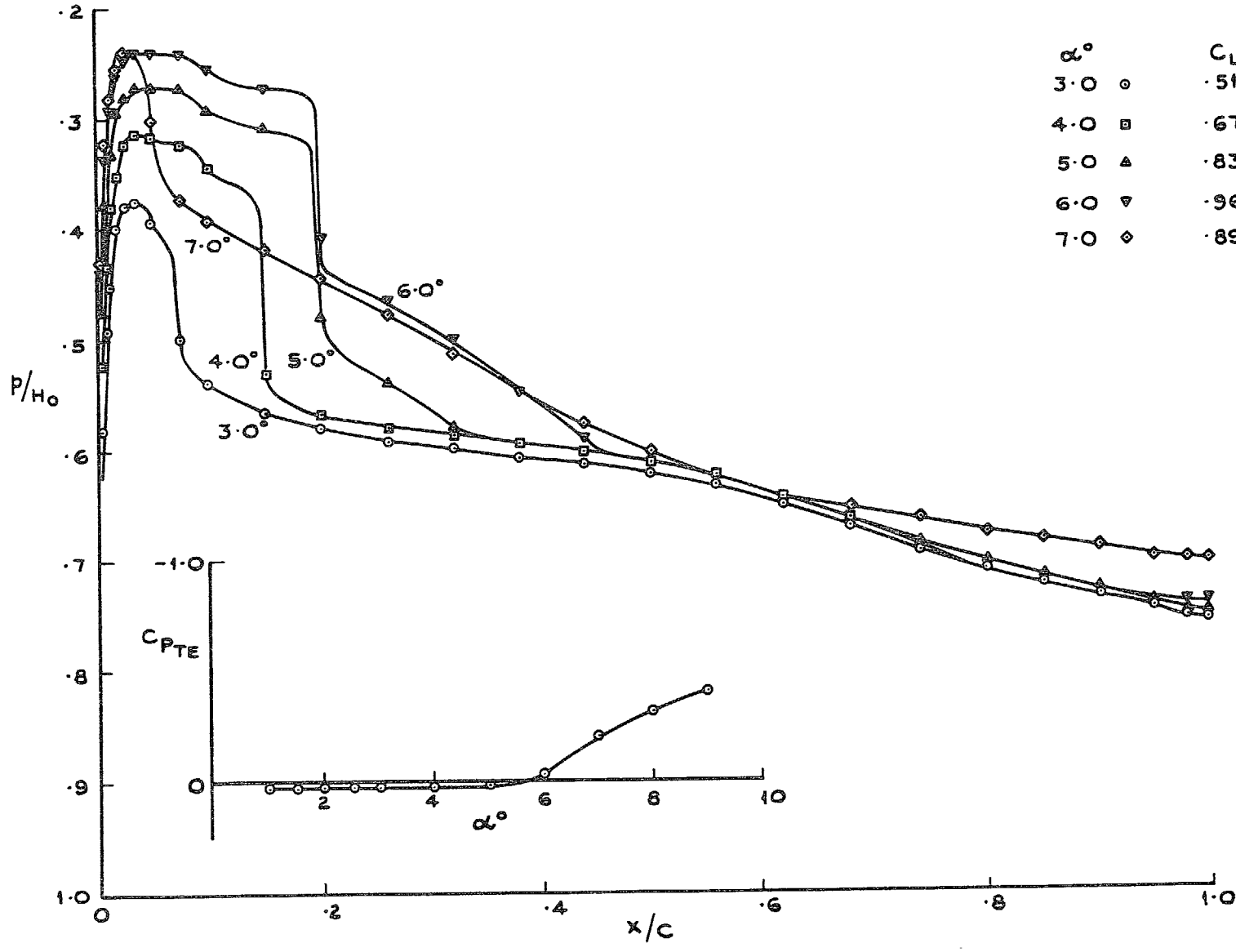


Fig 19 Upper surface pressure distributions $M_\infty = 0.65$

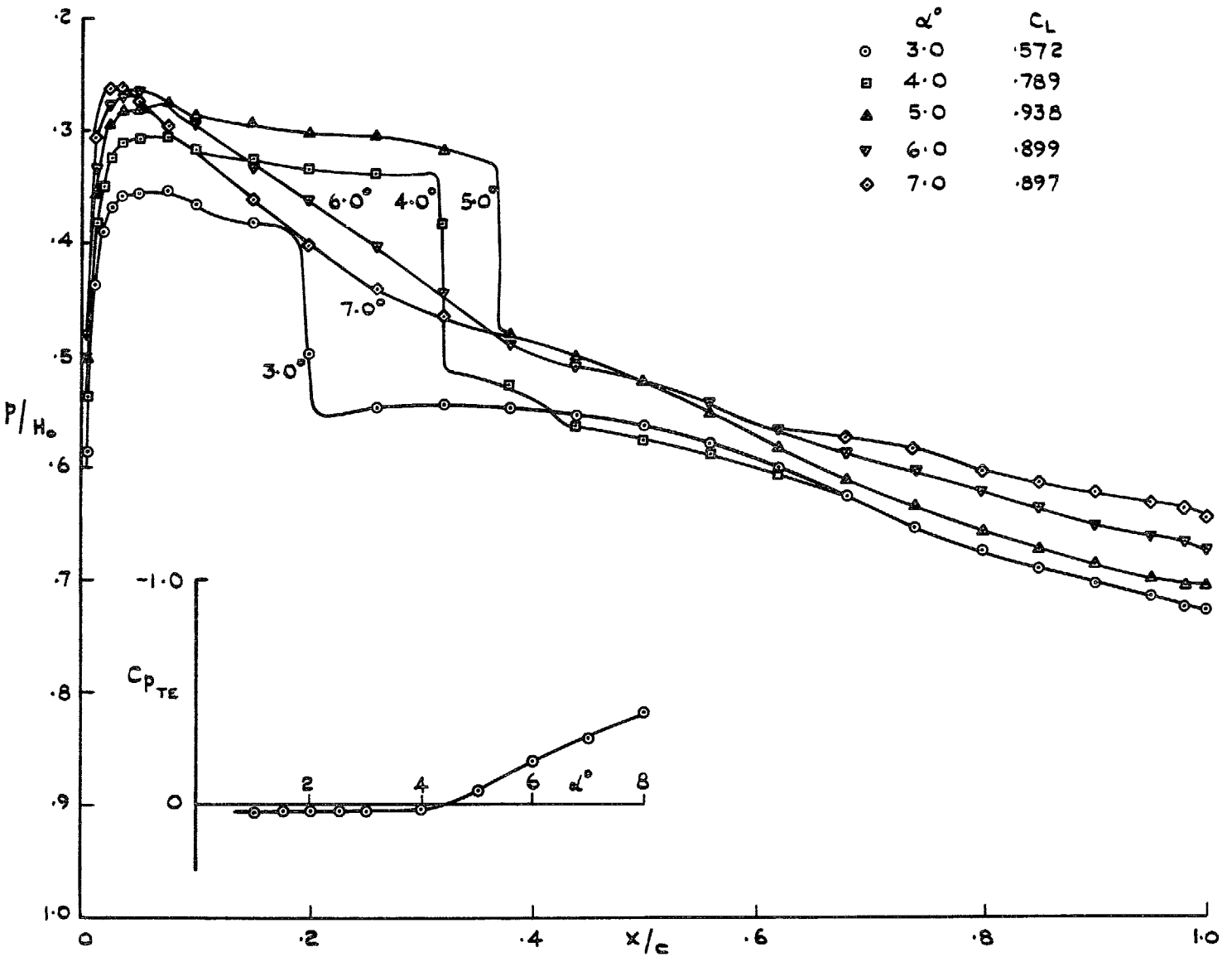


Fig 20 Upper surface pressure distributions $M_\infty = 0.7$

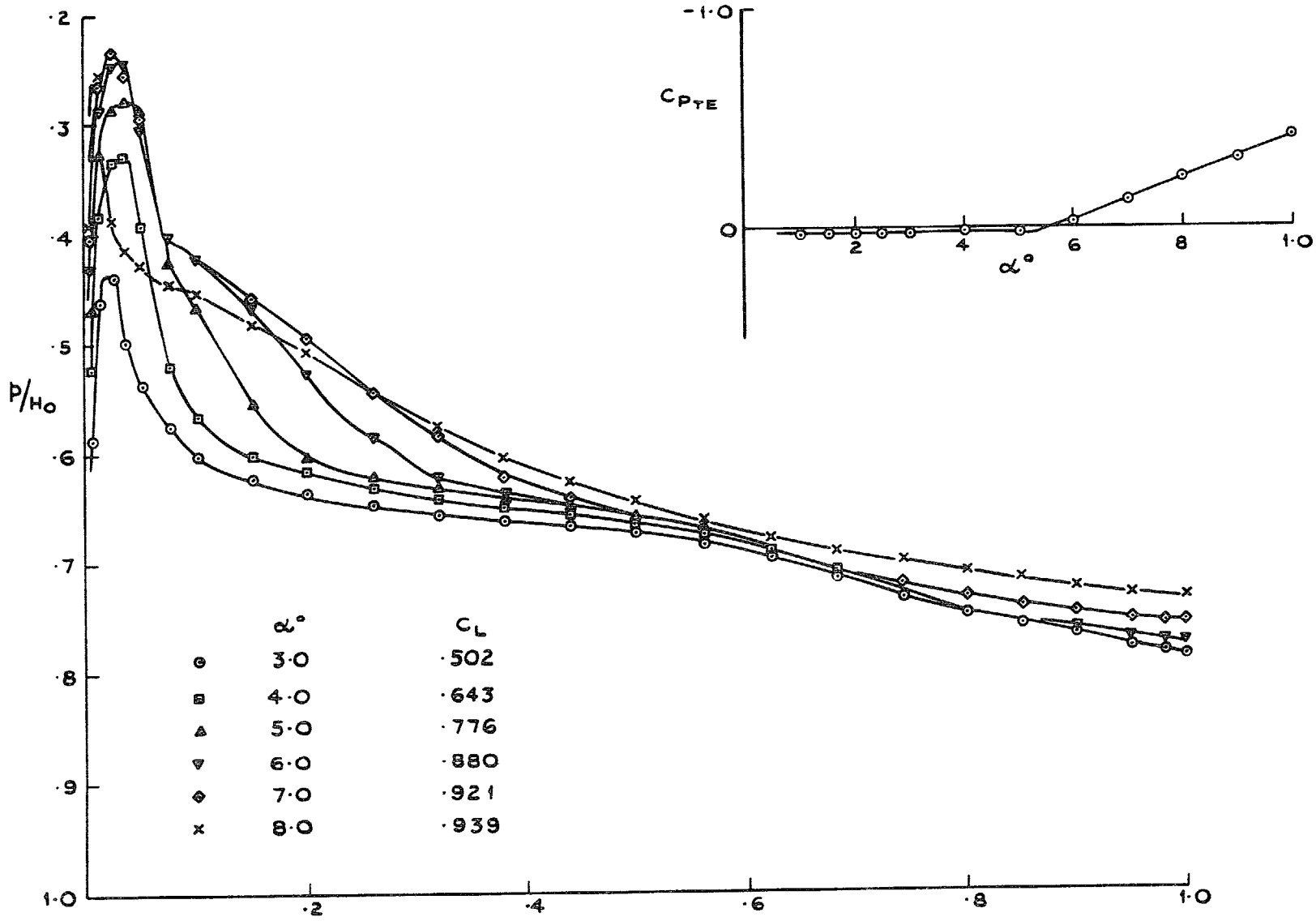


Fig 21 Upper surface pressure distributions $M_\infty = 0.6$

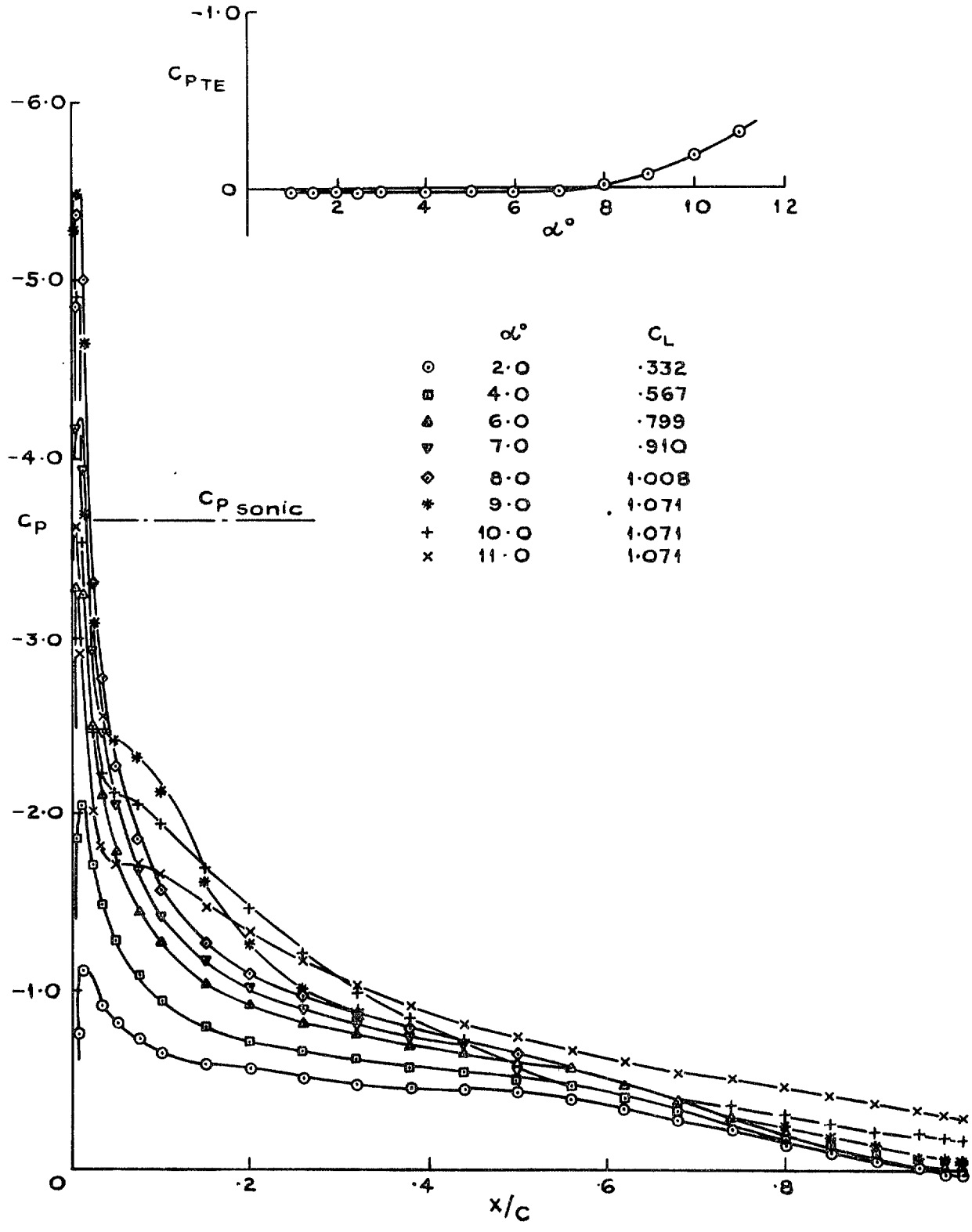


Fig 22 Upper surface pressure distributions $M_\infty = 0.4$

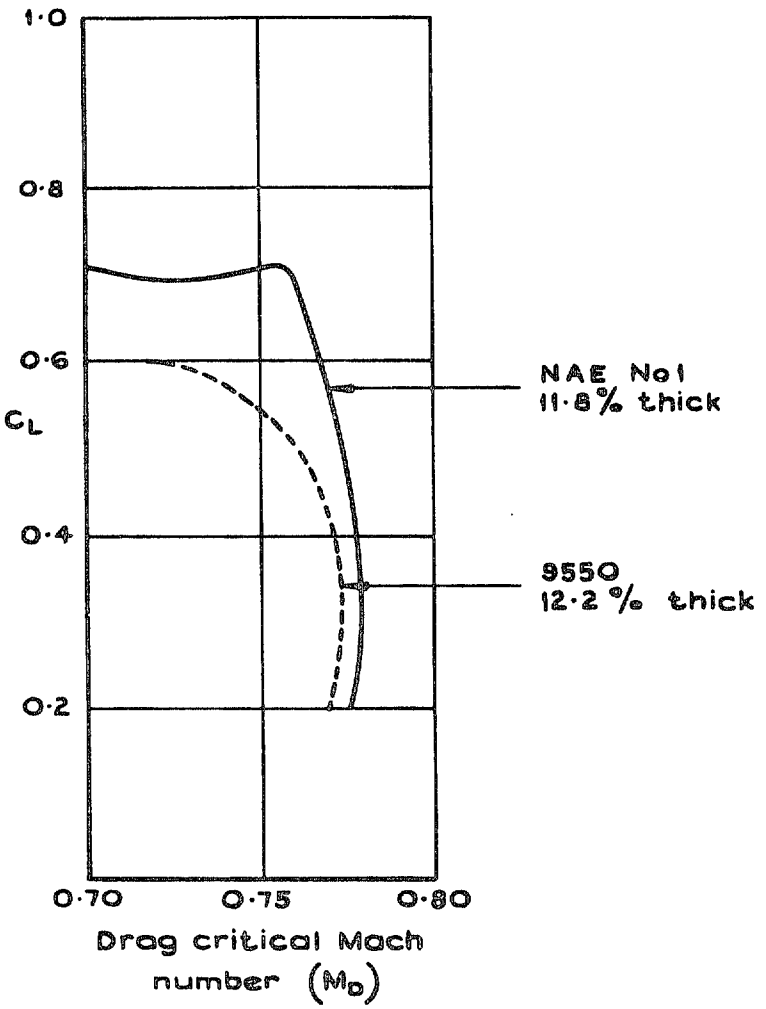
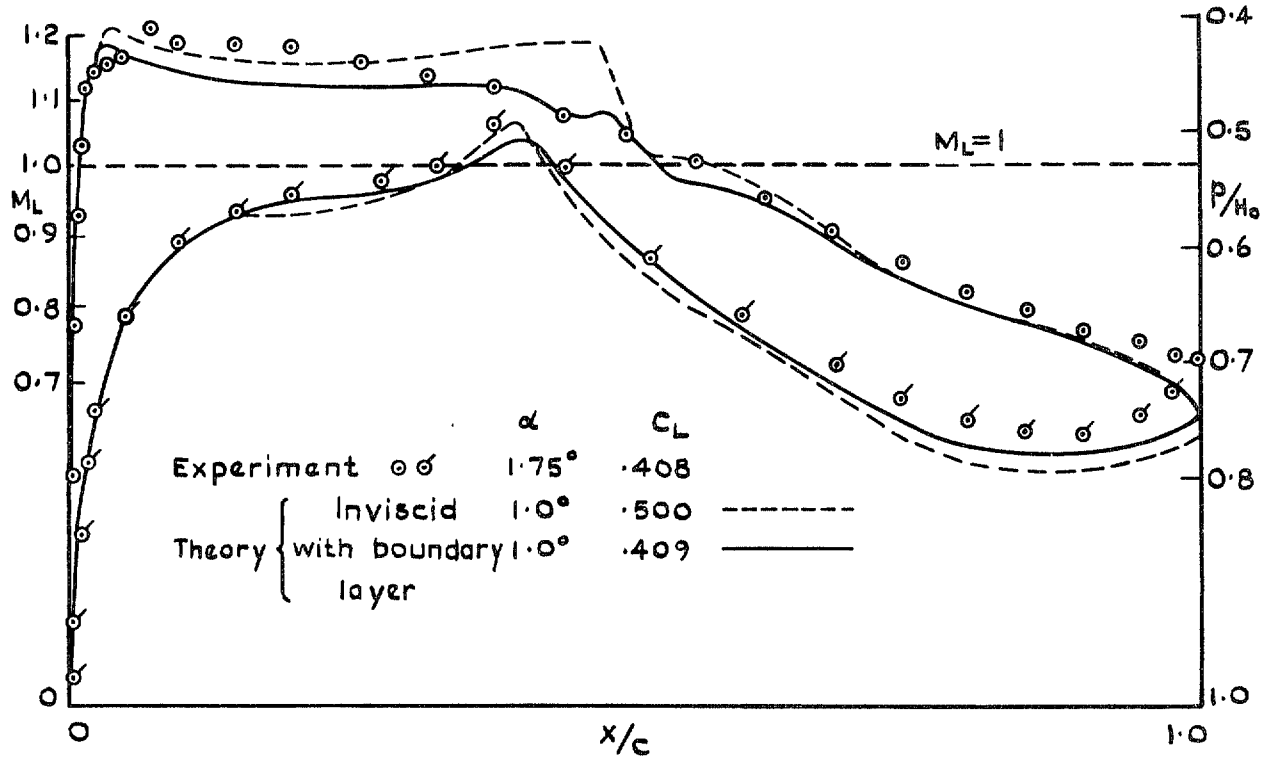
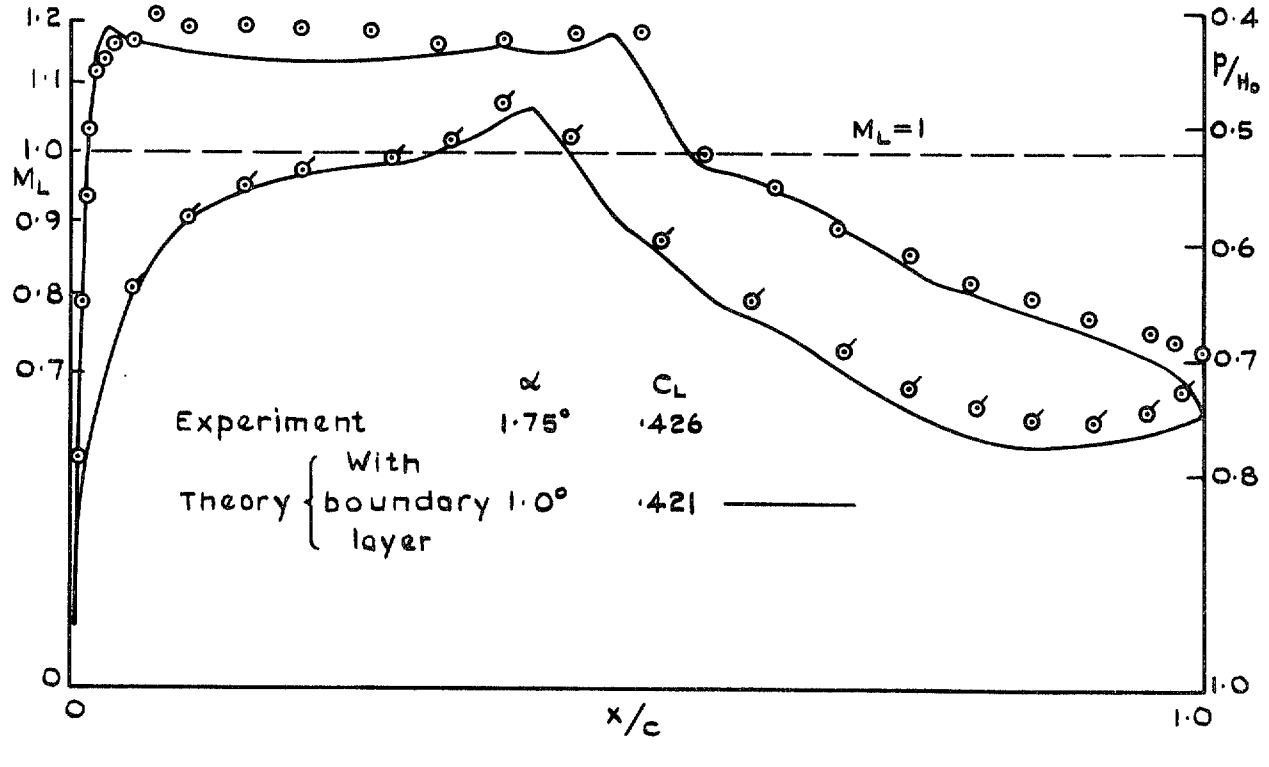


Fig 23 Drag divergence characteristics of 9550 and NAE No.1



a $M_\infty = 0 \cdot 76$



b $M_\infty = 0 \cdot 77$

Fig 24a&b 9550 — Comparison with theory

Produced in England for her Majesty's Stationary Office by the Royal Aircraft Establishment, Farnborough. Dd. 587484 K3 3/78.

Published by
HER MAJESTY'S STATIONERY OFFICE

Government Bookshops
49 High Holborn, London WC1V 6HB
13a Castle Street, Edinburgh EH2 3AR
41 The Hayes, Cardiff CF1 1JW
Brazennose Street, Manchester M60 8AS
Southey House, Wine Street, Bristol BS1 2BQ
258 Broad Street, Birmingham B1 2HE
80 Chichester Street, Belfast BT1 4JY

Government Publications are also available through booksellers

R &M No.3820

R &M No. 3820
ISBN 0 11 471153 4