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CENTER-LINE PRESSURE DISTRIBUTIONS ON TWO-DIMENSIONAL BODIES WITH LEADING-EDGE ANGLES GREATER THAN THAT FOR SHOCK DETACHMENT AT MACH NUMBER 6 AND ANGLES OF ATTACK UP TO 25°

By Theodore J. Goldberg, George C. Ashby, Jr.,
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Langley Research Center
Langley Station, Hampton, Va.

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SUMMARY

Center-line pressure distributions were obtained for two-dimensional sharp-nose parabolic arc, circular arc, and wedge bodies having a leading-edge angle greater than that for shock detachment (aerodynamically blunt bodies) at Mach number of 6 for angles of attack up to 25°. The maximum pressure coefficient was found to increase continuously from the shock-attachment value to the stagnation value behind a normal shock between leading-edge deflection angles of 42° and 51°. Only the data for contoured bodies having leading-edge angles of 66° or greater are correlated very well by the generalized Newtonian theory. However, at all angles of attack for all aerodynamically blunt bodies having curved surfaces, the agreement between the generalized Newtonian theory and the measured values of pressure coefficient was reasonably good for surface-deflection angles above 30°. This theory can be used to predict pressures on most two-dimensional bodies by the methods shown herein. With few exceptions, at a given deflection angle the pressure distributions rearward of the maximum pressure on the lower and upper surfaces of aerodynamically blunt wedges are essentially coincident with those of wedges having higher and lower half-angles, respectively. In addition, the pressure distributions of these wedges are in good agreement aft of the maximum-pressure point with those of a flat plate at corresponding deflection angles to the lower surface above 53° and to the upper surface above 31°.

INTRODUCTION

There is a large amount of available experimental and theoretical information in the hypersonic speed range for bodies having either rounded leading edges and therefore detached shock waves or sharp leading edges with attached shock waves. However there is very little, if any, available data in this speed range for the class of bodies with sharp leading edges having detached shock waves. The purpose of the present investigation is to provide some information in that area.

This report presents the center-line pressure distributions on a series of two-dimensional bodies having leading-edge angles from 42° to 90° which were measured in the Langley 20-inch Mach 6 tunnel at angles of attack up to 25°. In addition the means by which the pressure distributions can be predicted are also presented.

SYMBOLS

C_p	pressure coefficient, $\frac{p_l - p_\infty}{\frac{1}{2}(\gamma p_\infty M_\infty)}$
M_∞	free-stream Mach number
p_l	local pressure, lb/sq in.
p_t	total or stagnation pressure, lb/sq in.
p_∞	free-stream pressure, lb/sq in.
s	distance along body surface from nose, in.
s_w	total length of wedge surface, in.
t	half the maximum body thickness, in.
x, y	body coordinates
α	angle of attack, deg
γ	ratio of specific heats
δ	local inclination of the body surface referenced to wind axis, deg
θ	local inclination of body surface referenced to body axis, deg

Subscripts:

geom	geometric
l	lower surface
le	leading edge
max	maximum
stag	stagnation behind a normal shock
u	upper surface

APPARATUS AND METHODS

Wind Tunnel and Models

This investigation was conducted in the Langley 20-inch Mach 6 tunnel. The tunnel, which has been described in reference 1, is a blowdown-to-atmosphere type which operates at a maximum stagnation temperature of 600° F and a maximum stagnation pressure of 600 lb/sq in. The air is dried by an activated alumina dryer designed to provide a dewpoint temperature of -40° F at 600 lb/sq in.

The three groups of 5 two-dimensional models used in this investigation consisted of wedges and parabolic and circular arcs. Each group had leading-edge angles of 42°, 54°, 66°, 78°, and 90°. These models will herein be referred to by their leading-edge angles and contours. These contours were selected because they represent a large portion of the entire class of two-dimensional sharp-nose bodies having a leading-edge angle greater than that for shock detachment at a Mach number of 6. For a given deflection angle the wedge and the parabolic arc represent the minimum and maximum surface curvature of the present investigation, respectively, while the circular arc represents an intermediate curvature. Although the theoretical shock-detachment angle at Mach 6.0 is 42.4°, it was felt that a perfectly sharp leading edge could not be fabricated and that the shock for a 42°-leading-edge-angle model would be detached. This leading-edge angle would represent the lower limit of the aerodynamically blunt range. All models had a span of 4.00 inches and a thickness of 4.00 inches. The models were adapted with a 2.56-inch-long cylindrical section on the rear by using a "quick-disconnect" type connection to facilitate model changes. Photographs of the models and of the model attached to the support connection are shown in figures 1 and 2, respectively. Model dimensions are given in table I along with x,y locations of orifices, local inclinations at orifices, and surface distance-to-thickness ratios. Extensions, which were added to both sides of the 78° parabolic arc body to check the two dimensionality of the flow along the center line, were each 3 inches wide and contoured to match the basic body. A row of orifices on one of the extensions was located at the same position relative to the edge (2 inches inboard) as those on the basic body. This body was selected because it was the longest and any disturbance emanating from the tips of the models would affect the most rearward orifices. The 78° parabola with extensions is shown in figure 2. Model orifice sizes for the basic models and extensions were 0.021 inside diameter near the leading edges and 0.063 inside diameter at all other orifice locations.

The models were supported in the tunnel by the goose-neck support system shown in figure 3, which moved the model 25° in angle of attack in the horizontal plane. A mechanically operated counter geared to the vertical shaft of the support system was used to measure the angle of attack. Deflections due to air loads were negligible because of the stiffness of the sting support.

Tests

All models were tested in 5° increments over an angle-of-attack range of 0° to 25°. In addition, the 42°-leading-edge models were tested in 1° increments at angles of attack from 0° to 15°.

All tests reported herein were conducted at a stagnation pressure and temperature of 400 lb/sq in. absolute and 400° F which yields a Reynolds number of 7.6×10^6 per foot.

Pressure data were recorded by photographing a mercury manometer for pressures greater than 1 lb/sq in. absolute. For pressures of 1 lb/sq in. absolute or less a butyl phthalate manometer was used to obtain greater accuracy because of the low specific gravity of the fluid. Tunnel stagnation pressures were measured with a 0 to 600 lb/sq in. Bourdon gage. All pressures were photographically recorded simultaneously.

Data Reduction and Accuracy

Previous tunnel calibrations have shown that at any instant the Mach number throughout the test section varies by only ±0.02. However, the Mach number level varies from 5.94 to 6.04 depending upon time - the time during each run, the time between runs, and the total time elapsed. This fact makes it extremely difficult, if not impossible, to obtain an exact calibration curve of Mach number against time. The data, therefore, were initially reduced at an average Mach number of 6. This procedure resulted in sufficient data scatter to make difficult an analysis of data trends. One obvious trend emerged, however, which led to a better definition of test Mach numbers. This trend is shown in figure 4 where the maximum pressure coefficients obtained on the various bodies are presented as a function of the flow-deflection angles at which they were obtained. At flow-deflection angle for shock detachment ($\delta = 42^\circ$) the data agree with oblique shock theory. At higher flow-deflection angles the data approach and even exceed the stagnation-pressure-coefficient value at flow-deflection angles considerably less than 90°. The degree by which the data exceed $C_{p,stag}$, of course, is indicative of the data scatter. Since the data exceed $C_{p,stag}$ by as much as 4 percent which is much greater than measuring accuracy, the scatter is attributed to a true Mach number variation different from the assumed constant value of 6.0. By using the data trend shown in figure 4, a more representative Mach number variation for reducing the data was obtained by the following procedure. For each model the ratio of maximum-local to tunnel-stagnation pressure was assumed to be equal to the total pressure ratio across a normal shock. This ratio was then used to compute the corresponding Mach number for each model and α combination. At the angles of attack where the resulting Mach numbers fell within the known tunnel range these values of Mach number were used to reduce the data. The Mach numbers so obtained were applicable to all bodies except the 42° wedge at angles of attack below 7° and the 42° parabolic and circular arc bodies below $\alpha = 10^\circ$. For the 42° bodies at 0° angle of attack, the Mach numbers were computed by assuming the measured maximum pressure to be given by oblique shock theory. Since these Mach numbers again fell within the known range of tunnel Mach number, they were used to reduce the data for these models. For the angles of attack of the 42° bodies between 0° and 7° or 10°, as the case may be, a linear variation of Mach number with angle of attack between these limits was assumed. This assumption appears to be justifiable because the variation of tunnel Mach number with time is quasi-linear and in the same direction.

The center line of the body was considered to be the dividing line between the upper and lower surfaces at all angles of attack. The location of the maximum pressure point was determined from faired curves of P_l/P_t against θ on the upper and lower surfaces. Where no peak occurred beyond the first orifice, the values of P_l/P_t and θ at the first orifice were used to compute $C_{p,max}$ and δ_{max}. Where a peak occurred downstream of the first orifice, the faired values were used to compute $C_{p,max}$ and δ_{max}.

It should be noted that the data for the 78° parabolic arc body is the least reliable at angles of attack below 15° because the first orifice on the lower surface was inadvertently plugged. At 0° angle of attack the first orifice on the upper surface was used but it was located at an angle of about 8° less than that of the leading edge. At 5° and 10° angle of attack, the second orifice on the lower surface, which was located at an angle of about 12° less than the leading edge, was used. Therefore, the free-stream Mach number computed from the pressures at these orifices for these angles of attack is too high and results in a value of C_p which is too high. It is only this error in Mach number which raises a question as to the reliability of the data for the 78° body.

The maximum error of the measured pressures is believed to be less than 1 percent of the maximum measured value on the body. Model alinement and angles of attack are believed to be accurate to about $\pm 1/2°$. The accuracy of the x,y coordinates of the model orifices is ±0.001 inch. The measured coordinates were used to compute the slopes for all orifices.

RESULTS AND DISCUSSION

Experimental Results

Basic data.- The pressure distributions of the 78° parabolic arc model with and without extension pieces at $\alpha = -10°$, 0°, and 10° are presented in figure 5 to show the two dimensionality of the flow. Flow blockage prevented any measurements at higher angles of attack; therefore, the agreement between the distributions on the body with and without the extensions establishes only that the flow along the center line of this, the longest, body is two dimensional up to $\alpha = 10°$. However, all other bodies have the same span but are shorter; therefore, the flow along their center line, with the possible exception of the wedges having higher leading-edge angles, should also be two dimensional up to $\alpha = 10°$.

Pressure distributions of the 15 models tested are presented in figures 6, 7, and 8 for angles of attack up to 25°. In addition, schlieren photographs of all the bodies near 0° angle of attack are presented in figure 9 to show the variation of the shock shape with changes in leading-edge angle and body contour.

Maximum pressure coefficient.- One of the most important results of these tests is that stagnation pressure occurs on all of the bodies in this investigation having a leading-edge deflection angle greater than about 51° and that the maximum pressure coefficient for all bodies has its locus along a single representative curve. (See fig. 10.) The portion of the curve between

shock-detachment angle and 51° may be questionable because of the small uncertainty in the value of free-stream Mach number and the inability to locate the first orifice directly at the apex of the nose. However, if the maximum known tunnel Mach numbers were used to compute the pressure coefficients for this portion of the curve, it would shift the deflection angle at which stagnation occurs only about 2° to approximately 49°. In reference 2 stagnation pressure on a flat plate was measured at a deflection angle of 45°. The unrealistic maximum pressure coefficients that are predicted for bodies in this investigation by two modifications to the Newtonian theory are also shown in figure 10 for comparison.

On the upper surface, figure 11 shows that all measured values of $C_{p,max}$ do not lie along a single curve but vary with leading-edge angle and angle of attack. However, for each leading-edge angle the values of $C_{p,max}$ for all shapes tested generally fall along the same curve with the exception of the 78° and 90° bodies. As the leading-edge angle increases, the variation of $C_{p,max}$ with deflection angle approaches that predicted by modified Newtonian theory until at $\delta_{le} = 90°$ the curved-surface bodies agree with this theory.

Location of maximum pressure coefficients.- The location of the maximum pressures would be expected to occur at the point where the slope relative to the flow is the greatest - herein referred to as the geometric location. A comparison of the geometric and measured slopes at which the maximum pressures occurred on both the lower and upper surfaces of the parabolic and circular arc bodies is shown in figure 12. It must be remembered that physical limitations prevented the installation of the first orifice exactly at the leading edge. Therefore, in comparing the measured with the geometric location of $C_{p,max}$, they will be considered to coincide whenever the measured values differ from the geometric by the same difference as that indicated at 0° angle of attack. On the lower surface (fig. 12(a)) only for the 90° circular arc body do the measured and geometric locations coincide over the angle-of-attack range investigated. For all other bodies the measured location of $C_{p,max}$ moves off the nose before its angle relative to the flow becomes 90°. This result is attributed to the pressure bleed-off around the sharp leading edge. For bodies having leading-edge angles up to and including 66°, the measured location of $C_{p,max}$ moves off the nose when its angle relative to the flow becomes approximately 67°. This is also true for the wedges, as can be seen in figures 8(b) to (f). However, the maximum difference between the geometric and measured location for any body through the angle-of-attack range of the tests is only about 8°. On the upper surface the location of the maximum pressure might be expected to remain at the nose over the angle-of-attack range of the test. Figure 12(b) shows this to be true only for the 78° and 90° bodies. For bodies having leading-edge angles below 78° the location of $C_{p,max}$ is seen to move off the nose at angles of attack less than 20°. This result can be attributed to leading-edge separation around the nose followed by flow reattachment as indicated in figures 6, 7, and 8.

Comparison of center-line pressure distributions on wedges and a flat plate at corresponding deflection angles.- Another important result which can be obtained from these tests is the effect of leading-edge angle on the pressure distributions over the wedge surfaces at a given inclination to the flow. The

lower- and upper-surface pressure distributions, in terms of $C_p/C_{p,max}$ against s/s_w for wedges at approximately constant surface-deflection angles are presented in figure 13. The surface-deflection angles are only approximately constant because the wedge angles were varied in 12° increments whereas the angle of attack was varied in 5° increments. It can be seen that the maximum pressure point moves rearward on the lower surface with decreasing wedge angle only for deflection angles greater than about 66° and on the upper surface with increasing wedge angle only for deflection angles less than about 66°. The effect of leading-edge angle on wedge surface-pressure distributions is seen to be slight because, with few exceptions, at a given deflection angle, the pressure distributions rearward of the maximum pressure point on the lower and upper surfaces are essentially coincident with those of corresponding surfaces of wedges having higher and lower half-angles, respectively. Thus the wedge-surface pressure distributions are primarily a function only of flow-deflection angles. The effect of leading edge is confined to those regions ahead of the location of the maximum pressure coefficient. Since the value of $C_{p,max}$ on the lower surface is a constant (as shown in fig. 13), the pressure coefficients aft of the maximum pressure point on the lower surface at a given location of all wedges at the same deflection angles are also coincident. However, on the upper surface the value of $C_{p,max}$ varies not only with deflection angle but also with wedge angle at the same deflection angle; therefore, the pressure coefficients at a given location on the upper surface of wedges at the same deflection angles are not coincident. It should be noted that at $\delta = 66^\circ$ and above, the distributions on the lower and upper surfaces for the same δ agree. This can be seen from figures 13(a) and 13(b) since the data for each body at $\alpha = 0$ are presented in both.

Also included in figure 13 are flat-plate pressure distributions from reference 2 at approximately the same deflection angles as the wedge surfaces. In general, the pressure distributions of the wedges are in good agreement aft of the maximum pressure point with those of the flat plate at deflection angles of the lower surface above 53° and of the upper surface above 31°. This agreement might not be envisioned since in a subsonic-flow field behind a normal shock, the upper surface would be expected to affect the pressures on the lower surface of the wedge. It is interesting to note that for deflection angles from 27° to 37° the values of $C_{p,max}$ for the upper surface of wedges at angles of attack other than 0° are about the same as those for a flat plate at corresponding deflection angles.

Prediction of Pressures on Aerodynamically Blunt Bodies

Having obtained the pressure data on these bodies it is of interest to determine if there is a simple method of predicting pressures on two-dimensional aerodynamically blunt bodies. Probably the most widely used method of predicting pressures and forces (because of its simplicity and ease of calculating) is some form of the Newtonian theory

$$C_p = K \sin^2\delta$$

Various modifications of this theory have been found to give reasonably good predictions of the pressure distribution on different bodies, if the proper value of K is chosen. For example, it is shown in reference 3 that with $K = (\gamma + 1)$, the theory is applicable only to bodies having small leading-edge angles; and in reference 4, with $K = C_{p,stag}$, theory is limited to bodies having 90° leading-edge slopes. As can be seen in figure 10, neither of these modifications is applicable to the bodies of this investigation.

A more recent consideration of the Newtonian theory is presented in reference 5 which suggests that in the general case K has the form $\frac{C_{p,max}}{\sin^2\delta_{max}}$, thus acknowledging that K is not necessarily constant. This resulted in the generalized Newtonian theory

$$\frac{C_p}{C_{p,max}} = \frac{\sin^2\delta}{\sin^2\delta_{max}}$$

which was shown to predict the surface-pressure distribution reasonably well for pointed-nose bodies having a leading-edge angle less than that for shock detachment, as well as for bodies having a 90° leading-edge slope. (Unpublished work also shows that this generalized form of Newtonian theory can be derived by resorting to the tangent-wedge or tangent-cone approximations.) Therefore, it was decided to investigate this method for use in predicting the pressures on the two-dimensional aerodynamically blunt bodies studied herein.

Wedges.- Since the prediction of the pressure distribution for any body by means of the generalized Newtonian theory is basically dependent upon the body having a changing slope, it obviously cannot be applied in the same manner to wedges as to bodies having curved surfaces. However, it is shown in reference 5, that by using pressures computed from attached shock theory, the generalized Newtonian theory is applicable from one wedge to another, for wedge angles less than shock detachment at 0° angle of attack. For the aerodynamically blunt wedges of the present investigation it is apparent from figure 8 that the large and varied pressure gradients require any correlation with generalized Newtonian theory from one wedge to another, or from one surface to another for the same wedge at angle of attack, to be made at more than one point along the surface of the bodies. Even if this could be done with reasonably good results, the pressure distribution of one wedge would first have to be known. In view of the fact that experimental values must be resorted to, and since the data of the present investigation cover the range of aerodynamically blunt wedges, the pressure distribution of any wedge in this regime can be obtained by interpolating these data. In addition, the good agreement in pressure distribution from wedge to wedge at the same deflection angles, as well as the agreement from wedges to a flat plate at corresponding deflection angles (fig. 13), enables the pressure distribution to be obtained for either of the two types of bodies if one is known.

Parabolic and circular arc bodies.- Since the lower and upper surfaces of the bodies of the present investigation are separated by a sharp leading edge, which is shown in figures 6 and 7 to result in flow separation and reattachment

at some angles of attack and, therefore, a difference in the value of K between the two surfaces, the theory might not be expected to apply from surface to surface. Therefore, the data for each surface are reduced in the generalized Newtonian form by using their respective measured $C_{p,max}$ values. The results for the parabolic and circular arc models together with the generalized Newtonian theory prediction using the measured $C_{p,max}$ and its associated δ_{max} are presented in figures 14 and 15.

As can be seen from figures 14 and 15, the data for both the parabolic arc and circular arc bodies can be divided into two distinct correlation groups; bodies having a leading-edge angle closest to that for shock attachment (42° and 54°) and bodies having leading-edge angles much greater than shock attachment (66° to 90°). The data for the former group are not correlated with any consistency by the generalized Newtonian theory, whereas the data of the latter group were in general correlated very well for both surfaces by the theory.

The agreement between the measured and theoretical values in percent of the measured C_p cannot be made directly from figures 14 and 15 because the $C_{p,max}$ values are not constant for all bodies on either surface. Therefore, a majority of the measured and predicted values of C_p together with their differences in percent of measured C_p are presented in table II. As might be expected the agreement is best near the nose where the body slope is high and becomes progressively poorer as the surface inclination decreases; however, the disagreement does not in general become poorer than about 20 percent of measured C_p down to a surface inclination of 30° (the limit to which modified Newtonian theory is known to predict the pressures very well on cylinders). The very high percentage errors at inclinations below 30° may not be very significant because the pressures are very low over this region. There are points between the nose and the maximum pressure point on both surfaces of some bodies at angle of attack which cannot be predicted by the generalized Newtonian theory because the value of $\frac{\sin^2\delta}{\sin^2\delta_{max}}$ becomes greater than 1. But considering all points above deflection angles of 30°, the theory predicts about 85 percent of them within 10 percent of the measured C_p. It should be noted that whereas the data for the lower surface appear to be in better agreement with the theory than those of the upper surface in figures 14 and 15, table II shows that, on the basis of the percentage of measured C_p, both surfaces show about the same agreement for inclinations above 30°. The agreement for the circular arc bodies was, in general, better than that for the parabolic arc bodies and indicated that for the same leading-edge angle the gradient of slope along the body may be the important factor in determining how well the generalized Newtonian theory predicts the pressure distribution for two-diminensional aerodynamically blunt bodies, that is, the more rapidly the slope changes, the poorer the correlation.

Application of Generalized Newtonian Theory to Any Two-Dimensional Aerodynamically Blunt Body Having Curved Surfaces

It has been shown that the pressure distributions of the aerodynamically blunt bodies having curved surfaces of the present investigation agree reasonably well with the generalized Newtonian theory. However, in order to use this theory to predict the pressures on any body without resorting to experimentation, it is necessary to know a pressure at a given slope on the surface. Since the measured locations of the maximum pressures are shown in figure 12 to occur reasonably close to the geometric locations and because the maximum pressure on the lower surface is equal to stagnation value for the majority of deflection angles between shock detachment and 90° (fig. 10), it would be convenient to utilize the maximum pressure on the lower surface to predict the pressures over the whole body. An analysis shows that this can be accomplished as follows:

On the lower surface $C_{p,max} = C_{p,stag}$ for $\delta_{le} \geq 51°$, while for $\delta < 51°$, $C_{p,max}$ for deflection angles between 42° and 51° can be obtained from

$$\frac{C_{p,max}}{C_{p,stag}} = \frac{\sin^2\delta_{le}}{\sin^2 51°}$$

The values of $C_{p,max}$ obtained in this manner for these deflection angles are shown in figure 10 and are in good agreement with the measured values. For deflection angles equal to or less than shock detachment, $C_{p,max}$ is obtained from oblique shock theory.

The pressure distribution for the lower surface at each angle of attack can then be computed from

$$\frac{C_p}{C_{p,max}} = \frac{\sin^2\delta}{\sin^2\delta_{max,geom}}$$

and the pressure distributions for the upper surface can be obtained at any angle of attack from

$$\frac{C_p}{C_{p,max(\alpha=0°)}} = \frac{\sin^2\delta}{\sin^2\delta_{le(\alpha=0°)}}$$

The pressure coefficients predicted by this method for the parabolic and circular arc bodies are presented in table II. In general, these values are about the same as those obtained from the generalized Newtonian theory by using the values of $C_{p,max}$ at their actual locations on each surface and are within about 20 percent of the measured C_p at deflection angles above 30°. Some of the points between the nose and the actual location of the maximum pressure point, which could not be predicted by the generalized Newtonian theory by using $C_{p,max}$ at

its actual location for each surface, are not predicted by this method within this accuracy. However, on the whole, about 85 percent of all points at deflection angles above 30° are predicted within 10 percent of the measured C_p value.

The good agreement between the generalized Newtonian theory and the data of the present investigation as well as the results for bodies having a leading-edge angle less than that for shock detachment in reference 5 indicate that this theory may be applicable to all two-dimensional bodies except aerodynamically blunt wedges.

CONCLUSIONS

An investigation of the center-line pressure distributions on two-dimensional sharp-nose bodies having a leading-edge angle greater than that for shock detachment at a Mach number of 6 and angles of attack up to 25° has resulted in the following conclusions:

1. Stagnation pressure behind a normal shock was measured on all bodies having a leading-edge deflection angle greater than about 51° and the maximum pressure coefficient for all bodies has its locus along a single representative curve which continuously increases with increasing deflection angle between shock detachment and about 51°.

2. With few exceptions the center-line pressure distributions rearward of the maximum pressure point on the lower and upper surfaces of aerodynamically blunt wedges are primarily a function only of surface-deflection angle and essentially independent of leading-edge angle. In addition, the pressure distributions of these wedges are in good agreement aft of the maximum pressure point with those of a flat plate at corresponding deflection angles to the lower surface above 53° and to the upper surface above 31°.

3. Only the data for contoured bodies having leading-edge angles of 66° or greater are correlated very well by the generalized Newtonian theory. However, at all angles of attack for all aerodynamically blunt bodies having curved surfaces, the agreement between the generalized Newtonian theory and the measured values of C_p was reasonably good for surface-deflection angles above 30° (for 85 percent of the points in this region the theoretical values of C_p were within 10 percent of the measured C_p).

4. The generalized Newtonian theory can be used to predict the center-line pressures on aerodynamically blunt contoured bodies because the maximum pressures and their locations can be predetermined.

Langley Research Center,
National Aeronautics and Space Administration,
Langley Station, Hampton, Va., February 27, 1963.

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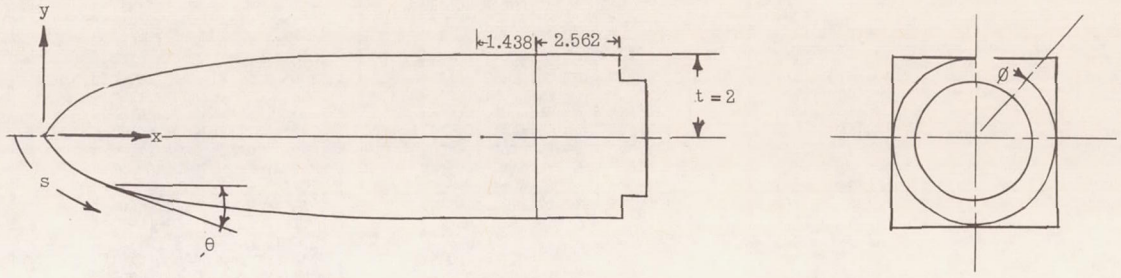
TABLE I.- MODEL DIMENSIONS AND ORIFICE LOCATIONS

(a) Parabolic arc models



42° parabolic arc				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.067	-0.060	41.23	0.045	180
.226	-.196	39.44	.149	
.407	-.342	37.46	.265	
.565	-.457	35.80	.363	
.726	-.568	34.15	.411	
1.227	-.880	29.33	.756	
1.512	-1.033	26.80	.918	
1.861	-1.199	23.88	1.110	
2.255	-1.358	20.82	1.324	
2.698	-1.512	17.66	1.558	
3.829	-1.792	10.75	2.142	
4.306	-1.873	8.26	2.383	
4.774	-1.933	6.02	2.619	
5.241	-1.975	3.97	2.854	
5.720	-1.999	2.03	3.093	
6.999	-2.000	0	3.733	↓
.172	.148	40.0	.114	0
.282	.236	38.82	.185	
.412	.338	37.41	.268	
.571	.456	35.73	.367	
.730	.569	34.11	.464	
.968	.725	31.76	.606	
1.226	.877	29.44	.755	
1.518	1.034	26.90	.921	
1.862	1.197	23.87	1.111	
2.257	1.359	20.81	1.325	
2.702	1.512	17.64	1.560	
3.836	1.794	10.71	2.113	
4.305	1.871	8.26	2.383	
4.776	1.932	6.01	2.620	
5.242	1.972	3.97	2.854	
5.718	1.994	2.05	3.092	
6.174	2.000	.35	3.321	
6.431	2.000	0	3.449	↓

54° parabolic arc				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.036	-0.052	53.04	0.030	180
.140	-.180	50.39	.114	
.275	-.332	47.19	.217	
.415	-.476	44.12	.317	
.610	-.654	40.21	.448	
.792	-.799	36.92	.565	
1.106	-1.065	31.89	.755	
1.446	-1.206	27.22	.951	
1.875	-1.403	22.27	1.187	
2.422	-1.601	17.10	1.477	
3.497	-1.850	9.54	2.029	
3.972	-1.923	6.96	2.269	
4.564	-1.975	4.21	2.567	
5.097	-1.996	2.09	2.834	
5.427	-1.997	.90	2.999	
6.701	-1.998	0	3.636	↓
.122	.156	50.83	.100	0
.194	.242	49.08	.156	
.275	.332	47.19	.217	
.419	.481	44.03	.320	
.610	.655	40.21	.448	
.793	.802	36.90	.565	
1.100	1.062	31.97	.752	
1.451	1.212	27.17	.953	
1.872	1.405	22.30	1.185	
2.423	1.602	17.10	1.478	
3.502	1.852	9.51	2.032	
4.030	1.924	6.37	2.298	
4.566	1.973	4.21	2.569	
5.097	1.988	2.09	2.834	
5.432	1.999	.89	3.002	
5.909	1.999	0	3.240	↓

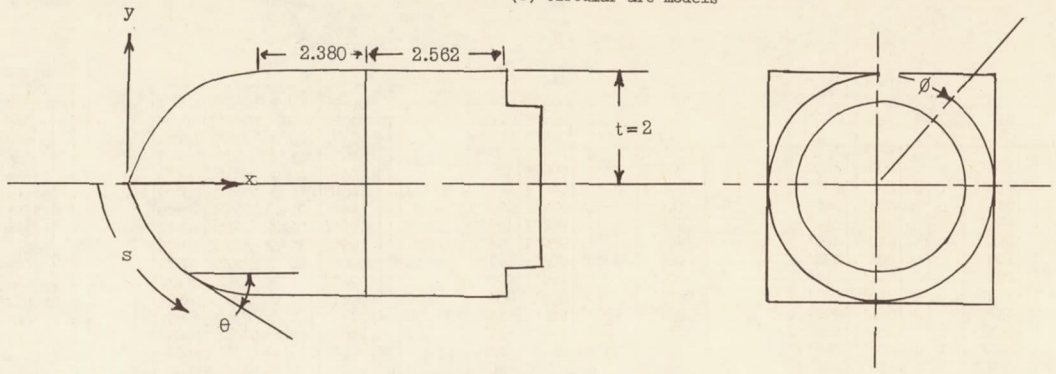
66° parabolic arc				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.026	-0.068	64.19	0.031	180
.105	-.202	59.35	.114	
.195	-.335	54.70	.197	
.293	-.468	50.37	.278	
.402	-.592	46.23	.360	
.664	-.829	38.33	.536	
.985	-1.051	31.22	.732	
1.446	-1.291	23.96	.992	
2.155	-1.521	16.54	1.369	
3.049	-1.761	10.53	1.829	
3.569	-1.846	7.99	2.092	
4.092	-1.910	5.90	2.355	
4.612	-1.958	4.16	2.616	
5.128	-1.987	2.69	2.875	
5.655	-1.998	1.38	3.138	
6.182	-2.000	.25	3.402	
7.263	-2.000	0	3.950	↓
.073	.147	61.21	.082	0
.134	.251	57.75	.142	
.196	.341	54.65	.198	
.299	.475	50.12	.282	
.406	.595	46.09	.362	
.667	.832	38.25	.538	
.988	1.053	31.17	.733	
1.448	1.291	23.94	.993	
2.055	1.518	17.41	1.317	
3.059	1.764	10.48	1.833	
3.567	1.846	8.00	2.091	
4.095	1.911	5.89	2.357	
4.617	1.958	4.15	2.619	
5.138	1.989	2.66	2.871	
5.653	1.999	1.39	3.138	
6.193	1.999	.22	3.407	
6.461	1.999	0	3.541	↓

78° parabolic arc				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.015	-0.069	73.93	0.031	180
.052	-.164	66.82	.086	
.108	-.267	59.51	.148	
.406	-.615	39.79	.375	
.777	-.862	28.87	.599	
1.309	-1.104	20.75	.891	
2.035	-1.331	14.74	1.272	
3.251	-1.583	9.47	1.893	
3.876	-1.678	7.56	2.197	
4.500	-1.754	6.17	2.523	
5.021	-1.805	5.20	2.785	
5.749	-1.863	4.07	3.150	
6.363	-1.902	3.28	3.458	
6.999	-1.934	2.56	3.776	
7.620	-1.957	1.95	4.087	
8.246	-1.975	1.40	4.400	
8.865	-1.988	.92	4.710	
9.491	-1.998	.48	5.023	
10.177	-1.999	.05	5.366	
11.256	-1.999	0	5.905	↓
.025	.084	70.56	.048	0
.062	.183	65.35	.098	
.102	.260	60.19	.142	
.230	.438	49.06	.252	
.381	.591	40.86	.359	
.782	.865	28.77	.602	
1.316	1.107	20.67	.895	
2.045	1.334	14.68	1.277	
3.249	1.584	9.35	1.892	
3.871	1.675	7.58	2.207	
4.502	1.751	6.16	2.524	
5.025	1.803	5.19	2.787	
5.748	1.861	4.08	3.150	
6.377	1.902	3.26	3.465	
7.000	1.933	2.56	3.777	
7.625	1.957	1.94	4.090	
8.251	1.974	1.40	4.403	
8.871	1.987	.92	4.713	
9.499	1.995	.48	5.027	
10.183	1.998	.05	5.369	
10.465	1.998	0	5.510	↓

90° parabolic arc				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.000	-0.007	89.62	0.004	180
.005	-.117	83.50	.051	
.019	-.214	77.79	.099	
.055	-.333	70.43	.167	
.124	-.480	61.21	.252	
.345	-.765	44.48	.433	
.665	-1.015	32.22	.636	
.958	-1.176	25.64	.803	
1.415	-1.362	19.16	1.050	
2.164	-1.574	12.93	1.439	
3.447	-1.794	7.20	2.090	
4.193	-1.874	5.12	2.465	
4.938	-1.930	3.52	2.839	
5.693	-1.967	2.23	3.217	
6.444	-1.992	1.16	3.593	
7.381	-1.999	.09	4.061	
8.457	-1.999	0	4.599	↓
.005	.110	83.90	.051	0
.040	.213	77.53	.143	
.057	.339	70.54	.169	
.125	.482	61.09	.253	
.335	.757	44.92	.426	
.662	1.014	32.27	.634	
.955	1.175	25.69	.801	
1.419	1.363	19.13	1.050	
2.163	1.574	12.93	1.439	
3.446	1.793	7.21	2.090	
4.198	1.874	5.11	2.468	
4.949	1.931	3.49	2.795	
5.695	1.967	2.22	3.218	
6.447	1.990	1.16	3.594	
7.384	1.998	.09	4.063	
8.167	1.999	0	4.454	↓

TABLE I.- MODEL DIMENSIONS AND ORIFICE LOCATIONS - Continued

(b) Circular arc models



42° circular arc				
Orifice location		Slope	s/t	ø, deg
x, in.	y, in.	θ, deg		
0.082	-0.075	41.19	0.056	180
.203	-.179	40.01	.136	
.278	-.239	39.30	.183	
.481	-.399	37.41	.312	
.675	-.542	35.63	.432	
.979	-.751	32.91	.618	
1.226	-.906	30.77	.764	
1.488	-1.053	28.56	.913	
1.979	-1.298	24.51	1.188	
2.27	-1.423	22.19	1.345	
3.036	-1.690	16.21	1.752	
3.567	-1.823	12.18	2.022	
4.082	-1.918	8.33	2.289	
4.609	-1.980	4.42	2.575	
5.121	-1.997	.66	2.749	
6.212	-1.998	0	3.293	↓
.162	.139	40.43	.105	0
.287	.243	39.24	.187	
.363	.305	38.51	.236	
.592	.480	36.39	.380	
.747	.592	34.99	.476	
.979	.749	32.92	.616	
1.233	.910	30.71	.768	
1.583	1.104	27.76	.967	
1.979	1.298	24.51	1.188	
2.273	1.424	22.16	1.347	
3.037	1.690	16.20	1.751	
3.567	1.823	12.18	2.022	
4.083	1.919	8.32	2.292	
4.609	1.982	4.42	2.586	
5.127	1.997	.62	2.738	
5.410	1.999	0	2.879	↓

54° circular arc				
Orifice location		Slope	s/t	ø, deg
x, in.	y, in.	θ, deg		
0.046	-0.064	53.07	0.040	180
.117	-.154	51.71	.097	
.195	-.247	50.29	.156	
.302	-.370	48.36	.237	
.422	-.500	46.27	.326	
.538	-.619	44.31	.409	
.721	-.789	41.36	.535	
.941	-.973	37.96	.679	
1.149	-1.127	34.91	.808	
1.376	-1.275	31.71	.943	
1.592	-1.399	28.77	1.067	
2.430	-1.762	17.96	1.524	
2.905	-1.890	12.15	1.769	
3.375	-1.967	6.52	2.002	
3.843	-1.995	.97	2.177	
4.932	-1.998	0	2.722	↓
.081	.105	52.44	.066	0
.183	.231	50.53	.146	
.285	.351	48.66	.225	
.342	.415	47.65	.268	
.472	.554	45.40	.364	
.605	.685	43.19	.457	
.736	.803	41.11	.545	
.919	.955	38.30	.664	
1.121	1.107	35.32	.791	
1.362	1.317	31.59	.984	
1.591	1.402	28.76	1.069	
2.434	1.765	17.91	1.529	
2.905	1.892	12.14	1.773	
3.377	1.968	6.49	2.005	
3.849	1.999	.90	2.226	
4.125	1.999	0	2.363	↓

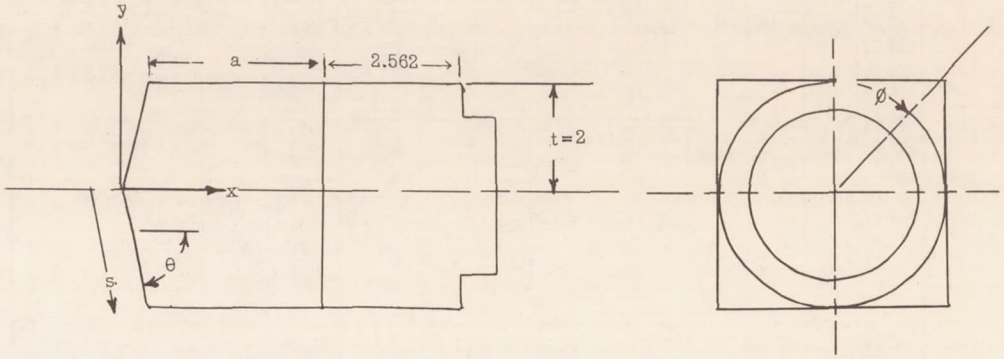
66° circular arc				
Orifice location		Slope	s/t	ø, deg
x, in.	y, in.	θ, deg		
0.016	-0.039	65.28	0.021	180
.060	-.128	63.59	.070	
.111	-.225	61.74	.125	
.177	-.341	59.45	.192	
.253	-.465	56.98	.265	
.382	-.647	53.19	.376	
.495	-.794	50.05	.469	
.611	-.922	47.10	.555	
.763	-1.079	43.39	.665	
.906	-1.207	40.12	.761	
1.111	-1.366	35.71	.891	
1.342	-1.517	31.04	1.028	
2.027	-1.834	18.18	1.411	
2.506	-1.952	9.79	1.656	
3.018	-1.997	1.04	1.876	
4.094	-2.000	0	2.414	↓
.058	.126	63.64	.070	0
.116	.238	61.49	.133	
.159	.314	60.01	.176	
.245	.455	57.37	.259	
.340	.595	54.33	.343	
.436	.722	51.63	.423	
.533	.839	49.04	.499	
.643	.958	46.29	.579	
.761	1.076	43.45	.663	
.906	1.208	40.12	.762	
1.108	1.366	35.76	.891	
1.325	1.510	31.33	1.022	
2.016	1.830	18.37	1.404	
2.497	1.950	9.94	1.652	
3.004	1.998	1.29	1.891	
3.361	2.000	0	2.069	↓

78° circular arc				
Orifice location		Slope	s/t	ø, deg
x, in.	y, in.	θ, deg		
0.004	-0.042	77.04	0.023	180
.022	-.128	75.05	.068	
.047	-.214	73.02	.112	
.089	-.329	70.27	.173	
.149	-.474	66.70	.251	
.208	-.599	63.57	.319	
.274	-.722	60.39	.389	
.382	-.899	55.70	.493	
.493	-1.051	51.43	.588	
.597	-1.171	47.83	.667	
.750	-1.325	42.90	.776	
.967	-1.506	36.49	.917	
1.174	-1.644	30.85	1.042	
2.072	-1.968	9.06	1.521	
2.386	-1.997	1.89	1.665	
3.470	-1.999	0	2.207	↓
.028	.124	75.11	.066	0
.056	.218	72.89	.114	
.091	.319	70.46	.167	
.147	.456	67.10	.241	
.205	.584	63.91	.311	
.273	.714	60.56	.385	
.351	.845	57.11	.461	
.445	.981	53.34	.544	
.544	1.105	49.76	.623	
.643	1.216	46.37	.698	
.744	1.315	43.16	.768	
.950	1.490	37.03	.904	
1.152	1.628	31.47	1.026	
2.039	1.964	9.82	1.507	
2.373	1.997	2.19	1.659	
2.678	1.999	0	1.811	↓

90° circular arc				
Orifice location		Slope	s/t	ø, deg
x, in.	y, in.	θ, deg		
0.001	-0.003	89.91	0.001	180
.002	-.073	87.90	.036	
.011	-.190	84.53	.095	
.028	-.323	80.71	.162	
.056	-.461	76.64	.232	
.089	-.582	73.06	.295	
.134	-.714	69.05	.365	
.215	-.897	63.31	.465	
.279	-1.014	59.47	.532	
.373	-1.156	54.59	.616	
.503	-1.322	48.54	.722	
.611	-1.538	44.00	.802	
.822	-1.614	36.11	.939	
1.523	-1.940	13.80	1.326	
1.929	-1.996	2.04	1.507	
3.004	-2.000	0	2.045	↓
.004	.089	87.45	.044	0
.009	.170	85.13	.085	
.021	.275	82.07	.138	
.042	.390	78.73	.196	
.071	.518	74.97	.261	
.112	.648	71.05	.330	
.176	.813	65.96	.418	
.239	.941	61.88	.489	
.318	1.076	57.39	.568	
.397	1.190	53.40	.637	
.505	1.322	48.51	.722	
.618	1.439	43.82	.803	
.826	1.614	36.02	.939	
1.508	1.934	14.27	1.314	
1.924	1.995	2.17	1.503	
2.204	1.999	0	1.643	↓

TABLE I.- MODEL DIMENSIONS AND ORIFICE LOCATIONS - Concluded

(c) Wedge models



42° wedge				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.054	-0.048	42.00	0.036	180
.203	-.183	↓	.136	↓
.357	-.321		.240	
.459	-.413		.308	
.573	-.516		.386	
.761	-.684		.512	
.944	-.850		.635	
1.125	-1.012		.756	
1.320	-1.188		.888	
1.498	-1.349		1.008	
1.687	-1.518		1.134	
2.145	-1.931		1.443	
3.216	-2.000	0	1.992	↓
.149	.134	42.00	.100	0
.256	.230	↓	.172	↓
.364	.328		.245	
.476	.428		.320	
.575	.517		.386	
.765	.689		.514	
.949	.855		.638	
1.141	1.027		.767	
1.326	1.192		.891	
1.510	1.358		1.015	
1.691	1.523		1.138	
2.155	1.941		1.450	
2.417	2.000	0	1.592	↓

a = 1.438

54° wedge				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.046	-0.063	54.00	0.039	180
.132	-.181	↓	.112	↓
.231	-.318		.196	
.318	-.438		.270	
.410	-.565		.349	
.560	-.771		.476	
.704	-.970		.599	
.934	-1.285		.794	
1.037	-1.428		.882	
1.146	-1.579		.976	
1.406	-1.936		1.196	
2.448	-2.000	0	1.734	↓
.099	.137	54.00	.084	0
.164	.226	↓	.140	↓
.231	.318		.196	
.324	.446		.276	
.417	.574		.354	
.564	.777		.480	
.714	.982		.607	
.932	1.284		.794	
1.042	1.435		.887	
1.148	1.581		.977	
1.412	1.944		1.201	
1.548	2.000	0	1.284	↓

a = 2.063

66° wedge				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.025	-0.057	66.00	0.031	180
.077	-.172	↓	.095	↓
.138	-.309		.169	
.198	-.445		.244	
.255	-.574		.314	
.359	-.806		.441	
.453	-1.017		.557	
.547	-1.229		.672	
.634	-1.424		.779	
.844	-1.895		1.037	
1.876	-2.000	0	1.588	↓
.046	.102	66.00	.056	0
.094	.210	↓	.115	↓
.136	.304		.166	
.190	.428		.234	
.266	.597		.326	
.355	.796		.436	
.452	1.016		.556	
.547	1.228		.672	
.630	1.415		.774	
.837	1.878		1.028	
1.101	2.000	0	1.200	↓

a = 2.625

78° wedge				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.002	-0.011	78.00	0.005	180
.028	-.133	↓	.068	↓
.061	-.288		.147	
.087	-.411		.210	
.117	-.548		.280	
.168	-.788		.403	
.219	-1.030		.526	
.274	-1.288		.658	
.325	-1.531		.782	
.404	-1.898		.970	
1.422	-2.000	0	1.520	↓
.022	.102	78.00	.052	0
.044	.208	↓	.106	↓
.068	.320		.164	
.089	.418		.214	
.117	.552		.282	
.168	.788		.403	
.222	1.041		.532	
.274	1.290		.660	
.297	1.400		.716	
.408	1.921		.982	
.622	2.000	0	1.121	↓

a = 3.090

90° wedge				
Orifice location		Slope	s/t	ø,
x, in.	y, in.	θ, deg		deg
0.000	0.000	90.00	0.000	180
↓	-.109	↓	.054	↓
	-.199		.100	
	-.314		.157	
	-.449		.224	
	-.696		.348	
	-.945		.472	
	-1.096		.548	
	-1.246		.623	
	-1.394		.697	
	-1.915		.958	
.995	-2.000	0	1.498	↓
.000	.112	90.00	.056	0
↓	.200	↓	.100	↓
	.333		.167	
	.455		.228	
	.700		.350	
	.958		.479	
	1.079		.540	
	1.206		.603	
	1.335		.668	
	1.930		.965	
.198	2.000	0	1.099	↓

a = 3.515

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES

(a) Parabolic arc bodies - lower surface

$\theta_{le} = 42^\circ$							$\theta_{le} = 54^\circ$							$\theta_{le} = 66^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)
0	41.232	1.2822	1.2822	1.2441	0	0.02971	0	53.041	1.8182	1.8178	1.7734	0.00022	0.02464	0	64.196	1.8179	1.8180	1.7656	-0.00006	0.02877
	39.441	1.1226	1.1908	1.1551	-.06075	-.02913		50.391	1.6148	1.6897	1.6484	-.04638	-.02808		59.356	1.6746	1.6600	1.6122	.00872	.03726
	35.800	.93906	1.0099	.97988	-.07543	-.04347		44.120	1.2832	1.3799	1.3462	-.07536	-.04910		50.375	1.3699	1.3303	1.2919	.02891	.05694
	29.332	.65852	.70248	.68158	-.06676	-.03502		40.217	1.0886	1.1872	1.1581	-.09058	-.06384		46.236	1.1989	1.1697	1.1360	.02476	.05246
	26.800	.57012	.60001	.58214	-.05243	-.02108		36.920	.94213	1.0273	1.0022	-.09040	-.06376		38.334	.91565	.86281	.83792	.05771	.08489
	23.884	.46761	.48380	.46940	-.03462	-.00383		31.892	.73125	.79519	.77575	-.08744	-.06085		31.229	.66833	.60305	.58565	.09768	.12371
	10.753	.14409	.10268	.09961	.28739	.30870		27.229	.55603	.59632	.58173	-.07246	-.04622		23.969	.44057	.37007	.35940	.16002	.18424
	3.976	.05815	.01426	.01382	.75477	.76234		17.108	.27568	.24620	.24018	.10694	.12877		16.548	.28411	.18199	.17674	.35944	.37792
	0	.01764	0	0	1.0000	1.0000		9.546	.13049	.07840	.07647	.39919	.41398		5.907	.08221	.02371	.02301	.71159	.72011
								0	.01598	0	0	1.0000	1.0000		0	.01218	0	0	1.0000	1.0000
5	46.232	1.6314	1.6314	1.5906	0	.02501	5	58.041	1.8177	1.8174	1.7805	.00017	.02047	5	69.196	1.8176	1.8177	1.7767	-.00006	.02250
	44.441	1.4039	1.5332	1.4949	-.09210	-.06482		55.391	1.6749	1.7103	1.6756	-.02114	-.00042		64.356	1.7371	1.6902	1.6521	.02700	.04893
	40.800	1.1608	1.3357	1.3022	-.15067	-.12181		49.120	1.3674	1.4434	1.4141	-.05558	-.03415		55.375	1.4719	1.4082	1.3764	.04328	.06488
	34.332	.83187	.99511	.97021	-.19623	-.16630		45.218	1.1874	1.2721	1.2463	-.07133	-.04960		51.236	1.3232	1.2645	1.2360	.04436	.06590
	31.800	.72034	.86866	.84692	-.20590	-.17572		41.920	1.0532	1.1270	1.1041	-.07007	-.04833		43.334	1.0450	.97952	.95744	06266	.08379
	28.884	.60192	.72989	.71163	-.21260	-.18227		36.892	.84084	.91032	.89185	-.08263	-.06067		36.229	.79406	.72669	.71030	.08484	.10548
	15.753	.22472	.23048	.22473	-.02563	-.00004		32.229	.66268	.71836	.70378	-.08402	-.06202		28.969	.55118	.48786	.47687	.11488	.13482
	8.979	.10756	.07627	.07436	.29091	.30866		27.272	.50222	.53000	.51926	-.05531	-.03393		15.534	.20918	.14917	.14581	.28688	.30294
	5.000	.05117	.01523	.01485	.70236	.70979		14.546	.19411	.15936	.15612	.17902	.19571		9.165	.10137	.05278	.05160	.47933	.49097
								9.219	.06354	.06476	.06346	-.01920	.00126		5.000	.03693	.01581	.01545	.57189	.58164
10	51.232	1.8190	1.8190	1.7809	0	.02095		5.000	.01534	.01919	.01880	-.25098	-.22555							
	49.441	1.5955	1.7267	1.6904	-.08223	-.05948								10	74.196	1.8187		1.7885		.01661
	45.800	1.3371	1.5379	1.5056	-.15018	-.12602									69.356	1.8069	1.7528	1.6915	.02994	.06387
	39.332	.98596	1.2021	1.1768	-.21922	-.19356	10	63.041	1.8185	1.8182	1.7882	.00016	.01666		60.375	1.5978	1.5123	1.4595	.05351	.08656
	36.800	.86787	1.0737	1.0511	-.23717	-.21088		60.391	1.7524	1.7299	1.7013	.01284	.02916		56.236	1.4638	1.3833	1.3350	.05499	.08799
	33.884	.73834	.93000	.91046	-.25958	-.23312		54.120	1.4905	1.5026	1.4777	-.00812	.00859		48.334	1.1946	1.1171	1.0780	.06488	.09706
	27.667	.50660	.64511	.63156	-.27341	-.24666		50.217	1.3295	1.3517	1.3294	-.01670	.00038		41.229	.94583	.86965	.83926	.08054	.11267
	16.029	.21390	.22825	.22345	-.06709	-.04465		46.920	1.1924	1.2210	1.2008	-.02399	-.00704		33.969	.69831	.62485	.60303	.10520	.13644
	10.000	.09771	.07321	.07169	.25074	.26630		41.892	.98312	1.0209	1.0040	-.03853	-.02124		26.548	.48615	.39991	.38595	.17739	.20611
								37.229	.80196	.83798	.82413	-.04491	-.02764		17.998	.23864	.19115	.18447	.19900	.22699
15	56.232	1.8186	1.8186	1.7868	0	.01749		32.272	.62755	.65237	.64158	-.03955	-.02236		14.165	.16171	.11991	.11571	.25849	.28446
	54.441	1.6716	1.7413	1.7108	-.04170	-.02345		27.107	.47149	.47501	.46715	-.00747	.00920		10.000	.07548	.06034	.05823	.20058	.22854
	50.800	1.4362	1.5804	1.5527	-.10040	-.08112		16.968	.21078	.19493	.19171	.07520	.09047							
	44.332	1.0984	1.2852	1.2627	-.17007	-.14958		10.000	.08348	.06901	.06787	.17333	.18699	15	79.196	1.7631		1.7986		-.02013
	41.800	.98350	1.1691	1.1487	-.18871	-.16797									74.356	1.8184	1.8038	1.7284	.00803	.04949
	38.884	.86305	1.0370	1.0188	-.20155	-.18046	15	68.041	1.8089		1.7936		.00846		65.375	1.6861	1.6074	1.5402	.04668	.00865
	32.667	.62216	.76667	.75325	-.23227	-.21070		65.391	1.8176	1.7890	1.7236	.05172	.05172		61.236	1.5736	1.4948	1.4323	.05008	.08979
	25.753	.40783	.49670	.48800	-.21791	-.19658		59.120	1.6138	1.5942	1.5360	.01215	.04821		53.334	1.3349	1.2516	1.1993	.06240	.10158
	18.979	.24477	.27848	.27361	-.13772	-.11782		55.217	1.4651	1.4601	1.4067	.00341	.03986		46.229	1.0857	1.0145	.97212	.06558	.10461
	15.000	.15212	.15404	.15133	-.01262	.00519		51.920	1.3319	1.3410	1.2920	-.00683	.02996		38.969	.83585	.76935	.73718	.07956	.11805
								46.892	1.1392	1.1540	1.1118	.01299	.02405		31.548	.61086	.53259	.51033	.12813	.16457
20	61.232	1.8170	1.8170	1.7909	0	.01436		42.229	.95019	.97791	.94217	-.02917	.00844		25.534	.39769	.36143	.34631	.09118	.12920
	59.441	1.7523	1.7532	1.7279	-.00051	.01392		37.272	.77671	.79366	.76465	-.02182	.01552		19.165	.22864	.20968	.20092	.08284	.12124
	55.800	1.5496	1.6176	1.5943	-.04388	-.02885		32.107	.59270	.61122	.58888	-.03125	.00645		15.000	.12920	.13032	.12487	-.00867	.03351
	49.332	1.2352	1.3605	1.3409	-.10144	-.08557		24.546	.36841	.37366	.36001	-.01425	.02280							
	46.800	1.1192	1.2566	1.2385	-.12277	-.10659		19.219	.24883	.23449	.22591	.05763	.09211	20	84.196	1.6818		1.8081		-.07510
	43.884	1.0062	1.1363	1.1199	-.12930	-.11300		15.000	.14102	.14501	.13970	-.02829	.00936		79.356	1.8179		1.7644		.02943
	37.667	.75410	.88297	.87027	-.17089	-.15405									70.375	1.7671	1.6946	1.6205	.04103	.08296
	30.753	.53493	.61818	.60929	-.15563	-.13901	20	73.041	1.7527		1.7997		-.02682		66.236	1.6856	1.6000	1.5305	.05078	.09225
	26.026	.39756	.45550	.44896	-.14574	-.12929		70.391	1.8177	1.8175	1.7454	.00011	.03978		58.334	1.4741	1.3838	1.3233	.06126	.10230
	20.000	.24067	.25064	.24702	-.04143	-.02638		64.120	1.6870	1.6581	1.5923	.01713	.05614		51.229	1.2370	1.1613	1.1106	.06120	.10218
								60.217	1.5650	1.5430	1.4818	.01406	.05316		43.969	.98858	.92068	.88046	.06868	.10937
25	66.232	1.8187		1.7978		.01149		56.920	1.4517	1.4381	1.3810	.00937	.04870		36.548	.75520	.67746	.64788	.10294	.14211
	64.441	1.8138	1.7902	1.7466	.01301	.03705		51.892	1.2666	1.2685	1.2182	-.00150	.03821		30.534	.52810	.49303	.47149	.06641	.10720
	60.800	1.6619	1.6763	1.6355	-.00866	.01589		47.229	1.0883	1.1040	1.0602	-.01443	.02582		27.998	.44090	.42101	.40263	.04511	.08680
	54.332	1.3774	1.4520	1.4167	-.05416	-.02853		42.272	.91303	.92665	.88989	-.01492	.02534		24.165	.33299	.32015	.30617	.03856	.08054
	51.800	1.2632	1.3586	1.3255	-.07552	-.04932		37.107	.72789	.74533	.71577	-.02396	.01665		20.000	.20627	.22346	.21369	-.08334	-.03597
	48.880	1.1490	1.2486	1.2182	-.08668	-.06023		29.546	.47774	.49823	.47847	-.04289	-.00153							
	42.667	.88970	1.0105	.98588	-.13578	-.10810		24.219	.34337	.34465	.33097	-.00373	.03611							
	35.753	.65514	.75094	.73266	-.14623	-.11833		20.000	.21458	.23963	.23012	-.11674	-.07242	25	89.196	1.6187		1.8185		-.12343
	31.029	.50699	.58469	.57047	-.15326	-.12521									84.356	1.8062		1.8012		.00277
	28.979	.45822	.51653	.50394	-.12725	-.09978	25	78.041	1.7269		1.8054		-.04546		75.375	1.8188	1.7624	1.7027	.03101	.06383
	25.000	.32612	.36394	.35508	-.11597	-.08880		75.391	1.8178		1.7664		.02828		71.236	1.7621	1.6877	1.6306	.04222	.07463
								69.120	1.7818	1.7315	1.6468	.02823	.07577		63.334	1.5922	1.5033	1.4530	.05583	.08743
								65.217	1.6839	1.6350	1.5550	.02904	.07655		56.229	1.3890	1.3009	1.2569	.06343	.09510
								61.920	1.5880	1.5439	1.4684	.02777	.07531		48.969	1.1328	1.0712	1.0349	.05438	.08642
								56.892	1.4182	1.3920	1.3239	.01847	.06649		41.548	.90941	.82817	.80014	.08933	.12015
								52.229	1.2496	1.2395	1.1789	.00808	.05658		35.534	.66082	.63585	.61434	.03779	.07034
								47.272	1.0747	1.0701	1.0178	.00428	.05295		32.998	.57524	.55841	.53951	.02926	.06211
								42.107	.87839	.89152	.84791	-.01495	.03470		30.907	.51230	.49646	.47965	.03092	.06373
								34.546	.61134	.63796	.60675	-.04354	.00751		29.165	.45189	.44712	.43198	.01056	.04406
								31.968	.52485	.55596	.52876	-.05927	-.00745		25.000	.30903	.33624	.32486	-.08805	-.05122
								29.219	.45289	.47257	.44945	-.04345	.00760							
								25.000	.31147	.35427	.33695	-.13741	-.08181							

a,b See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(a) Parabolic arc bodies - lower surface - Concluded

$\theta_{le} = 78^\circ$							$\theta_{le} = 90^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)
0	70.560	1.8192	1.8192	1.6909	0	0.07053	0	89.633	1.8183	1.8183	1.8182	0	0.00011
	66.612	1.7205	1.7236	1.6018	-.00180	.06899		83.508	1.7990	1.7951	1.7950	.00217	.00222
	59.517	1.5597	1.5195	1.4122	.02577	.09457		77.797	1.7330	1.7372	1.7371	-.00242	-.00237
	39.792	.95817	.83825	.77900	.12516	.18699		70.437	1.6129	1.6144	1.6144	-.00093	-.00093
	28.875	.60391	.47732	.44358	.20962	.26549		61.219	1.4225	1.3968	1.3967	.01807	.01814
	20.759	.38482	.25718	.23899	.33169	.37896		44.481	1.0019	.89279	.89275	.10890	.10894
	14.743	.23748	.13260	.12323	.44164	.48109		32.224	.63411	.51682	.51680	.18654	.18500
	9.470	.13178	.05538	.02019	.57975	.84679		25.648	.46671	.34073	.34071	.26993	.26997
	6.172	.07668	.02361	.02194	.69210	.71388		19.168	.30430	.19599	.19599	.35593	.35593
	2.565	.02607	.00366	.00382	.85961	.85347		12.935	.18482	.09108	.09108	.50720	.50720
	0	.00237	0	0	1.0000	1.0000		5.121	.06340	.01446	.01446	.77192	.77192
								0	.00436	0	0	1.0000	1.0000
5	71.612	1.8185	1.8187	1.6623	-.00011	.08589							
	64.517	1.6917	1.6457	1.5043	.02719	.11078	5	94.633	1.8180		1.8061		.00655
	44.792	1.1250	1.0027	.91651	.10871	.18532		88.508	1.8180	1.8180	1.8167	0	.00072
	33.875	.74707	.62727	.57374	.15982	.23201		82.797	1.7992	1.7907	1.7894	.00472	.00545
	25.759	.50109	.38161	.34882	.23844	.30388		75.437	1.7164	1.7042	1.7030	.00711	.00781
	19.743	.33110	.23046	.19072	.30396	.42398		66.219	1.5597	1.5234	1.5223	.02327	.02398
	12.569	.15467	.09560	.08738	.38191	.43506		49.481	1.1610	1.0514	1.0507	.09440	.09500
	7.565	.05873	.03502	.03201	.40317	.45496		37.224	.79419	.66552	.66506	.16201	.16259
	5.000	.02002	.01535	.01402	.30291	.36331		30.648	.60297	.47281	.47248	.21557	.21641
								24.168	.41550	.30490	.30470	.26619	.26667
10	76.612	1.8184	1.8184	1.7231	0	.05241		17.935	.26629	.17247	.17236	.35232	.35274
	69.517	1.7405	1.6862	1.5977	.03120	.08205		10.121	.10892	.05612	.05609	.48476	.48503
	49.792	1.2537	1.1209	1.0621	.10593	.15283		5.000	.02867	.01383	.01382	.51761	.51796
	38.875	.88814	.75715	.71741	.14749	.19223							
	30.759	.61804	.50281	.47642	.18644	.22914	10	99.633	1.7827		1.7677		.00841
	24.743	.42646	.33679	.31911	.21027	.25172		93.508	1.8098		1.8118		-.00111
	15.207	.16201	.13207	.12514	.18480	.22758		87.797	1.8186	1.8186	1.8159	0	.00148
	12.565	.10359	.09096	.08619	.12192	.16797		80.437	1.7840	1.7710	1.7684	.00729	.00874
	10.000	.05209	.05793	.05490	-.11211	-.05395		71.219	1.6661	1.6325	1.6300	.02017	.02167
								54.481	1.3089	1.2066	1.2048	.07816	.07953
15	81.612	1.8182	1.8182	1.7795	0	.02128		42.224	.94529	.82232	.82110	.13009	.13138
	74.520	1.7862	1.7254	1.6887	.03404	.05459		35.648	.73546	.61867	.61776	.15880	.16004
	54.792	1.3880	1.2405	1.2141	.10627	.01253		29.168	.53445	.43257	.43194	.19063	.19180
	43.875	1.0448	.89268	.87368	.14560	.16378		15.121	.16457	.12386	.12368	.24737	.24847
	35.759	.76556	.63464	.62113	.17101	.18866		10.000	.06628	.05490	.05483	.17170	.17275
	29.743	.55391	.45742	.44770	.17420	.19175							
	17.565	.16819	.17173	.16807	-.02105	.00071	15	104.63	1.7142		1.7023		.00694
	15.000	.10432	.12446	.12180	-.19306	-.16342		98.508	1.7648		1.7787		-.00788
								92.797	1.8096		1.8141		-.00249
20	86.612	1.8000		1.8125		-.00694		85.437	1.8184	1.8184	1.8069	0	.00632
	79.517	1.8188	1.7851	1.7586	.01853	.03310		76.219	1.7502	1.7261	1.7152	.01377	.02000
	59.792	1.5289	1.3791	1.3586	.09798	.11139		59.481	1.4579	1.3581	1.3495	.06845	.07435
	48.875	1.1989	1.0478	1.0323	.12603	.13896		47.224	1.1050	.98572	.97948	.10795	.11359
	40.759	.91897	.78719	.77550	.14340	.15612		40.648	.89607	.77658	.77167	.13335	.13883
	34.743	.69355	.59984	.59093	.13512	.14796		34.168	.67826	.57718	.57352	.14903	.15442
	29.470	.48378	.44684	.44020	.07636	.09008		27.935	.47119	.40158	.39903	.14773	.15314
	25.207	.33538	.33470	.32973	.00203	.01685		20.121	.25086	.21646	.21510	.13713	.14255
	22.565	.24709	.27189	.26785	-.10037	-.08402		15.000	.12145	.12260	.12181	-.00947	-.00296
	20.000	.17383	.21596	.21276	-.24236	-.22395							
							20	109.663	1.6230		1.6135		.00585
25	91.612	1.7420		1.8187		-.04403		103.508	1.6991		1.7198		-.01218
	84.517	1.8189		1.8023		.00913		97.797	1.7764		1.7854		-.00507
	64.792	1.6607	1.5248	1.4892	.08183	.10327		90.437	1.8189		1.8136		.00291
	53.875	1.3812	1.2154	1.1870	.12004	.14060		81.219	1.8180	1.7861	1.7765	.01755	.02283
	45.759	1.1029	.95616	.93379	.13305	.15333		64.481	1.5830	1.4894	1.4814	.05913	.06418
	39.743	.86458	.76154	.74371	.11918	.13980		52.224	1.2673	1.1423	1.1361	.09863	.10353
	34.470	.64194	.59658	.58263	.07066	.09239		45.648	1.0574	.93510	.93008	.11566	.12041
	32.569	.56252	.53965	.52703	.04066	.06309		39.168	.82781	.69831	.69457	.15644	.16095
	30.207	.47497	.47126	.46024	.00781	.03101		32.935	.59699	.54054	.53761	.09456	.09947
	29.079	.43369	.44005	.42975	-.01466	.00908		27.206	.34969	.38210	.38004	-.09268	-.08679
	27.565	.37490	.39888	.38955	-.06396	-.03908		22.230	.22350	.26181	.26041	-.17141	-.16515
	25.000	.28922	.33266	.32487	-.15020	-.12326		20.000	.19370	.21392	.21277	-.10439	-.09845
							25	114.633	1.5031		1.5029		.00013
								108.508	1.5944		1.6358		-.02597
								102.797	1.6982		1.7296		-.01849
								95.437	1.7878		1.8026		-.00828
								86.219	1.8189	1.8189	1.8110	0	.00434
								69.481	1.6820	1.6025	1.5955	.04727	.05143
								57.224	1.3993	1.2913	1.2856	.07718	.08125
								50.648	1.2092	1.0924	1.0876	.09659	.10056
								44.168	.97590	.88690	.88300	.09120	.09519
								37.935	.74263	.69042	.68738	.07003	.07440
								30.121	.47246	.45996	.45794	.02646	.03073
								28.521	.40930	.41638	.41456	-.01730	-.01285
								25.000	.29548	.32631	.32487	-.10434	-.09947

a,b See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(b) Parabolic arc bodies - upper surface

$\theta_{le} = 42°$							$\theta_{le} = 54°$							$\theta_{le} = 66°$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)
0	40.044	1.0974	1.0976	1.1854	-0.00018	-0.08019	0	50.839	1.6530	1.6530	1.6701	0	-0.07034	0	61.215	1.7390	1.7390	1.6732	0	0.03784
	38.824	1.0514	1.0416	1.1256	.00932	-.07057		49.090	1.5541	1.5700	1.5863	-.01023	-.02072		57.757	1.6153	1.6193	1.5582	-.00248	.03535
	37.413	.99001	.97869	1.0571	.01143	-.06777		47.190	1.4446	1.4794	1.4947	-.02409	-.03469		54.654	1.5037	1.5061	1.4492	-.00160	.03624
	35.735	.93783	.90415	.97681	.03591	-.04156		44.035	1.2882	1.3284	1.3421	-.03121	-.04184		50.129	1.3428	1.3337	1.2831	.00678	.04446
	34.110	.86294	.83395	.90055	.03359	-.04358		40.217	1.0998	1.1462	1.1581	-.04219	-.05301		46.096	1.1951	1.1754	1.1308	.01648	.05380
	31.761	.75797	.73473	.79348	.03066	-.04685		36.901	.94839	.99117	1.0015	-.04511	-.05600		38.256	.90556	.86773	.83510	.04178	.07781
	29.441	.66589	.64015	.69187	.03866	-.03905		31.979	.74752	.77136	.77936	-.03189	-.04259		31.171	.65950	.60637	.58355	.08056	.11516
	26.900	.56767	.54264	.58617	.04409	-.03259		22.307	.42712	.39589	.40000	.07312	.06350		23.941	.43805	.37258	.35869	.14946	.18117
	17.641	.28897	.24325	.26300	.15822	.08987		17.101	.27693	.23772	.24018	.14159	.13271		17.410	.28789	.20282	.19501	.29549	.32262
	10.714	.13734	.09167	.09898	.33253	.27931		6.374	.09608	.03382	.03417	.64800	.64436		8.007	.10934	.04386	.04226	.59887	.61350
	3.970	.05386	.01270	.01373	.76420	.74508		2.094	.03725	.00369	.00372	.90094	.90013		4.150	.06076	.01186	.01141	.80481	.81221
	0	.02193	0	0	1.0000	1.0000		0	.02286	0	0	1.0000	1.0000		0	.01786	0	0	1.0000	1.0000
5	35.044	.86132	.86149	.94422	-.00020	-.09625	5	45.839	1.3601	1.3598	1.4299	.00022	-.05132	5	56.215	1.5499	1.5499	1.5047	0	.02916
	33.824	.82310	.80906	.88735	.01706	-.07806		44.080	1.2734	1.2791	1.3441	-.00448	-.05552		52.757	1.4112	1.4216	1.3802	-.00737	.02197
	32.413	.77736	.75064	.82283	.03437	-.05849		32.190	1.1825	1.1917	1.2527	-.00778	-.05937		49.654	1.2965	1.3031	1.2653	-.00509	.02406
	30.735	.73162	.68221	.74797	.06754	-.02235		39.035	1.0355	1.0482	1.1018	-.01226	-.06403		45.129	1.1485	1.1271	1.0941	.01863	.04737
	29.110	.66269	.61847	.67775	.06673	-.02273		35.217	.86403	.87887	.92379	-.01718	-.06916		41.096	1.0035	.96959	.94118	.03379	.06210
	26.761	.56370	.52979	.58059	.06016	-.02996		31.901	.73224	.73800	.77577	-.00787	-.05945		33.256	.72095	.67452	.65503	.06440	.09143
	24.441	.48851	.44634	.49027	.08632	-.00360		26.979	.56201	.54408	.57186	.03190	-.01753		26.171	.50348	.43633	.42373	.13337	.15840
	21.900	.40204	.36340	.39840	.09611	.00905		17.307	.29478	.23371	.24571	.20717	.16646		18.941	.31822	.23622	.22950	.25768	.27880
	12.641	.19528	.12493	.13715	.36025	.29768		12.101	.18678	.11613	.12207	.37825	.34645		12.410	.19678	.10372	.10060	.47291	.48877
	5.714	.08813	.02591	.02839	.70600	.67786		1.374	.04585	.00151	.00159	.96707	.96532		3.007	.06234	.00615	.00599	.90135	.90391
	-1.030	.02548						-2.906	.00364						-.850	.02702				
	-5.000	.02293						-5.000	.02284						-5.000	-.00334				
10	30.044	.66342	.66355	.71782	-.00020	-.08200	10	40.839	1.1025	1.1023	1.1881	.00018	-.07764	10	51.215	1.3739	1.3739	1.3236	0	.03661
	28.824	.64183	.61481	.66567	.04210	-.03714		39.080	1.0290	1.0247	1.1037	.00418	-.07259		47.757	1.2312	1.2389	1.1937	-.00625	.03046
	27.413	.59295	.56106	.60703	.05378	-.02375		37.190	.95802	.94170	1.0148	.01704	-.05927		44.654	1.1226	1.1167	1.0759	.00526	.04160
	25.735	.54914	.49887	.53992	.09154	.01679		34.035	.83930	.80758	.87020	.03779	-.03682		40.129	.97499	.93943	.90484	.03647	.07195
	24.110	.49517	.44180	.47784	.10778	.03500		30.217	.67895	.65300	.70361	.03822	-.03632		36.096	.84223	.78495	.75607	.06801	.10230
	21.761	.41072	.36389	.39362	.11402	.04163		26.901	.57124	.52774	.56867	.07615	.00460		28.256	.57424	.50656	.48818	.11786	.14987
	19.441	.34596	.29294	.31724	.15325	.08302		21.979	.42314	.36128	.38922	.14619	.080163		21.171	.38504	.29480	.28411	.23437	.26213
	16.900	.27803	.22364	.24200	.19563	.12959		12.307	.20955	.11700	.12614	.44166	.39804		13.941	.23615	.13081	.12643	.44607	.46462
	7.641	.12310	.04668	.05063	.62080	.58871		7.101	.12387	.03939	.042447	.68201	.65733		7.410	.13132	.03767	.03623	.71314	.72411
	.714	.04882	.00042	.00044	.99140	.99099		-3.626	.02167						-1.993	.03082				
	-6.030	.00818						-7.906	-.00097						-5.850	.00601				
	-10.000	-.00071						-10.000	-.01138						-10.000	-.01571				
15	25.044	.50172	.50187	.51315	-.00030	-.02278	15	35.839	.81574		.95246		-.16760	15	46.215	1.1758		1.1353		.03444
	23.824	.45663	.45648	.46726	.00033	-.02328		34.080	.83929	.82578	.87208	.01610	-.03906		42.757	1.1541	1.0650	1.0039	.07720	.13014
	22.413	.41957	.40710	.41630	.02972	.00779		32.190	.75379	.74594	.78820	.01041	-.04565		39.654	.96823	.94108	.88705	.02804	.08384
	20.735	.38807	.35085	.35897	.09591	.07499		29.035	.64908	.61931	.65433	.04586	-.00808		35.129	.80788	.76543	.72125	.05254	.10723
	19.110	.35101	.30024	.30693	.14464	.12558		25.217	.53507	.47727	.50424	.10802	.05762		31.096	.67301	.61666	.58104	.08373	.13665
	16.761	.29603	.23297	.23816	.21302	.19549		21.901	.42913	.36580	.38649	.14758	.09936		23.256	.44306	.36014	.33958	.18715	.23356
	14.441	.24106	.17393	.17809	.27848	.26122		16.979	.30459	.22434	.23695	.26347	.22207		16.171	.29017	.17917	.16896	.38253	.41772
	11.900	.18980	.11903	.12176	.37287	.35848		7.307	.13916	.04247	.04491	.69481	.67728		8.941	.17768	.05572	.05262	.68640	.70385
	2.641	.07429	.00591	.00608	.92045	.91816		2.101	.07163	.00353	.00373	.95072	.94793		2.410	.08694	.00412	.00385	.95261	.95572
	-4.286	.02241						-10.789	-.00706						-10.850	-.01002				
	-11.030	-.00035						-15.000	-.02007						-15.000	-.02307				
	-15.000	-.00122																		
20	20.044	.36460	.38458	.33640	-.05480	.07735	20	30.839	.47898		.73011		-.52430	20	41.215	1.0507		.94568		.099952
	18.824	.36460	.34039	.29815	.06640	.18225		29.080	.58734		.65639		-.11756		37.757	1.0024	.97334	.81665	.02899	.18531
	17.413	.33468	.29314	.25647	.12412	.23369		27.190	.57310	.53493	.57988	.06660	-.01183		34.654	.75834	.73947	.70426	.02485	.07131
	15.735	.29866	.24059	.21061	.19444	.29482		24.035	.49136	.42515	.46082	.13475	.06215		30.129	.64102	.65447	.54882	.02098	.14383
	14.110	.25776	.19465	.17018	.24484	.33977		20.217	.37310	.30609	.33176	.17960	.11080		26.096	.52434	.50262	.42148	.04142	.19617
	11.761	.21075	.13608	.11898	.35431	.43544		16.901	.29755	.21661	.23479	.27202	.21092		18.256	.38546	.25468	.21375	.21748	.34324
	9.441	.17046	.08789	.07655	.48440	.55092		11.979	.21211	.11050	.11969	.47904	.43572		11.171	.19623	.09741	.08176	.50359	.58335
	6.900	.13566	.04722	.04133	.65192	.69534		2.307	.08765	.00413	.00450	.95288	.94866		3.941	.10777	.01223	.01029	.88652	.90452
	-2.359	.05568						-2.899	.04121						-2.590	.04504				
	-9.286	.01905						-13.626	-.01266											
	-16.030	.00135						-17.956	-.01947											
	-20.000	-.00029						-20.000	-.02381											
25	15.044	.20452	.34618	.19293	-.69265	.05667	25	25.839	.24493		.52777		-1.1548	25	36.215	.61803		.76037		-.23031
	13.824	.26378	.29285	.16350	-.11021	.38017		24.080	.30892		.46236		-.49670		32.757	.76970	.73943	.63771	.03933	.17148
	12.413	.25884	.23739	.13233	.08287	.48876		22.190	.41235	.41212	.39621	.00056	.03914		29.654	.59663	.61835	.53320	-.03640	.10631
	10.735	.23230	.17808	.09936	.23341	.57228		19.035	.36456	.30744	.29548	.15668	.18949		25.129	.49216	.61835	.39283	-.25640	.20182
	9.110	.20452	.12889	.07179	.36979	.64898		15.217	.27643	.19915	.19139	.27956	.30764		21.096	.39462	.45579	.28220	-.15501	.28488
	6.761	.16254	.07127	.03969	.56152	.75581		11.901	.21223	.12292	.11814	.42082	.44334		13.256	.23855	.13273	.11453	.44360	.51989
	4.441	.12859	.03071	.01717	.76118	.86647		6.979	.14304	.04273	.04103	.70127	.71316		6.171	.14100	.02916	.02517	.79319	.82148
	1.900	.09835	.00565	.00315	.94255	.96797		-2.693	.04102						-1.059	.06800				
	-7.359	.03353						-7.899	.01380						-7.590	.02269				
	-14.286	.00822						-18.626	-.02418						-16.993	-.01633				
	-21.030	-.00023						-22.906	-.03003						-20.850	-.02388				
	-25.000	-.00029						-25.000	-.03052						-25.000	-.02640				

[a], [c] See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(b) Parabolic arc bodies - upper surface - Concluded

$\theta_{le} = 78^\circ$							$\theta_{le} = 90^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)
0	70.560	1.8192	1.8192	1.6908	0	0.07058	0	83.900	1.7990	1.7990	1.7978	0	0.000667
	65.353	1.6853	1.6899	1.5707	-.00273	.06800		77.532	1.7474	1.7348	1.7336	.00721	.00790
	60.192	1.5546	1.5405	1.4316	.00907	.07912		70.540	1.6279	1.6175	1.6165	.00639	.00700
	40.864	1.0113	.87584	.81393	.13395	.19516		61.096	1.4344	1.3946	1.3935	.02775	.02851
	28.773	.60519	.47381	.44053	.21709	.27208		44.922	.99129	.90713	.90666	.08490	.08537
	20.678	.38354	.25522	.23709	.33457	.38184		32.279	.63784	.51907	.51858	.18621	.18697
	14.680	.24004	.13144	.12211	.45242	.49129		25.692	.46547	.34219	.34175	.26485	.26584
	9.350	.13306	.05399	.05019	.59424	.62280		19.131	.31799	.19544	.19530	.38539	.38583
	6.168	.07860	.02361	.02195	.69962	.72074		12.938	.19416	.09114	.09115	.53059	.53054
	2.563	.02735	.00411	.00380	.84973	.86106		7.217	.09459	.02871	.02870	.69648	.69659
	0	.00237	0	0	1.0000	1.0000		3.497	.04357	.00666	.00676	.84714	.84485
								0	.00250	0	0	1.0000	
5	65.560	1.7451	1.7451	1.5760	0	.09690							
	60.353	1.5739	1.5902	1.4362	-.01036	.08749	5	78.900	1.7522	1.7522	1.7509	0	.00074
	55.192	1.4155	1.4197	1.2818	-.00297	.09445		72.532	1.6563	1.6557	1.6545	.00036	.00109
	35.864	.85203	.72279	.65261	.15168	.23405		65.540	1.5152	1.5075	1.5066	.00508	.00568
	23.773	.48178	.34199	.30897	.29015	.35869		56.096	1.2945	1.2536	1.2525	.03160	.03244
	15.678	.29118	.15385	.13885	.47163	.52315		39.922	.84121	.74922	.74883	.10935	.10982
	9.680	.17656	.05956	.05376	.66266	.69551		27.279	.51394	.38235	.38195	.25604	.25682
	4.350	.08384	.01211	.01094	.85556	.86951		20.692	.36347	.22735	.22702	.37450	.37541
	1.168	.04198	.00086	.000790	.97951	.98118		14.131	.23745	.10844	.10838	.54331	.54357
	-2.437	.00399						7.932	.13275	.03466	.03463	.73891	.73913
	-5.000	-.00824						2.217	.05626	.00273	.00272	.95148	.95165
								-1.503	.01739				
10	60.560	1.5646	1.5646	1.4421	0	.07829		-5.000	-.01145				
	55.353	1.3718	1.3961	1.2868	-.01771	.06196							
	50.192	1.2003	1.2177	1.1220	-.01450	.06523	10	73.900	1.6661	1.6661	1.6785	0	-.00744
	30.864	.66515	.54299	.50039	.18366	.24770		67.532	1.5433	1.5413	1.5527	.00130	-.00609
	18.773	.35673	.21352	.19693	.40145	.44796		60.540	1.3681	1.3682	1.3785	-.00007	- 00760
	10.678	.20786	.07091	.06528	.65886	.68594		51.096	1.1337	1.0932	1.1012	.03572	.02867
	4.680	.11490	.01375	.01266	.88033	.88982		34.922	.68190	.59132	.59588	.13283	.12615
	-.650	.04643						22.279	.39205	.27104	.26134	.30866	.33340
	-3.832	.01565						15.692	.26917	.13216	.13302	.50901	.50581
	-7.437	-.01010						9.131	.16457	.04547	.04579	.72370	.72176
	-10.000	-.01450						2.932	.08140	.00473	.00476	.94189	.94152
								-6.503	-.00115				
								-10.000	-.01816				
15	55.560	1.3955	1.3955	1.2914	0	.07460							
	50.353	1.1863	1.2163	1.1273	-.02529	.04973							
	45.192	1.0167	1.0330	.95706	-.01603	.05866	15	68.900	1.5476	1.5476	1.5827	0	-.02268
	25.864	.52699	.39053	.36185	.25894	.31336		62.532	1.4005	1.3998	1.4315	.00050	-.02213
	13.773	.26274	.11619	.10777	.55778	.58982		55.540	1.2067	1.2086	1.2362	-.00157	-.02445
	5.678	.14126	.02012	.01861	.85757	.86826		46.096	.96804	.92314	.94391	.04638	.02493
	-.320	.06988						29.922	.55642	.44227	.45243	.20515	.18689
	-5.650	.02041						17.279	.29948	.15694	.16042	.47596	.46434
	-8.832	-.00150						10.692	.19973	.06128	.06259	.69319	.68663
	-12.437	-.01653						4.131	.10693	.00922	.00944	.92240	.91171
	-15.000	-.01841						-2.062	.04821				
								-7.783	.00781				
20	50.560	1.2277	1.2277	1.1341	0	.07624		-11.503	-.01366				
	45.353	1.0217	1.0418	.96241	-.01967	.05803		-15.000	-.02186				
	40.192	.84446	.85757	.79189	-.01552	.06225							
	20.864	.40457	.26116	.24117	.35448	.40389	20	63.900	1.4309	1.4309	1.4664	0	-.02481
	8.773	.18015	.04782	.04423	.73455	.75448		57.532	1.2622	1.2630	1.2943	-.00063	-.02543
	.678	.09217	.00028	.000266	.99696	.99711		50.540	1.0599	1.0575	1.0839	.00226	-.02264
	-5.320	.03519						41.096	.79420	.76675	.78563	.03456	.01079
	-10.650	.00263						24.922	.43339	.31493	.32286	.27333	.25504
	-13.832	-.01151						12.279	.21843	.07853	.08224	.64048	.62348
	-17.437	-.01810						5.692	.13029	.01750	.01789	.86568	.86269
	-20.000	-.02203						-.869	.06624				
								-7.062	.02122				
25	45.560	1.0266	1.0266	.96929	0	.05583		-12.783	-.00732				
	40.353	.83832	.84420	.79718	-.00701	.04907		-16.503	-.02254				
	35.192	.66946	.66914	.63153	.00048	.05666		-20.000	-.02507				
	15.864	.29398	.15053	.14207	.48796	.51674							
	3.773	.12925	.00469	.00823	.96371	.93632	25	58.900	1.2823	1.2823	1.3332	0	-.03969
	-4.322	.05808						52.532	1.1041	1.1018	1.1454	.00208	-.03741
	-10.320	.01315						45.540	.89836	.89075	.92630	.00847	-.031101
	15.650	-.00870						36.096	.63757	.60714	.63111	.04773	.01013
	-18.832	-.01821						19.922	.32800	.20295	.21110	.38125	.35640
	-22.437	-.02119						7.279	.14664	.02811	.02919	.80831	.80094
	-25.000	-.01838						.692	.08159	.00026	.00027	.99681	.99669
								-5.869	.03407				
								-12.062	.00092				
								-17.783	-.01784				
								-21.503	-.02722				
								-25.000	-.02660				

[a], [c] See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(c) Circular arc bodies - lower surface

$\theta_{le} = 42^\circ$							$\theta_{le} = 54^\circ$							$\theta_{le} = 66^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)
0	41.19	1.2802	1.2798	1.2397	0.00031	0.03164	0	53.07	1.8182	1.8181	1.7749	0.00005	0.02381	0	65.28	1.8182	1.8184	1.7977	-0.00011	0.01127
	40.01	1.1786	1.2205	1.1822	-.03555	-.00305		51.71	1.6974	1.7532	1.7117	-.03287	-.00842		63.59	1.7647	1.7674	1.7474	-.00153	.00980
	39.30	1.1341	1.1842	1.1470	-.04418	-.01137		50.29	1.6008	1.6836	1.6437	-.05172	-.02680		61.74	1.6997	1.7094	1.6900	-.00571	.00571
	37.41	1.0375	1.0898	1.0556	-.05041	-.01745		48.36	1.5092	1.5895	1.5518	-.05321	-.02823		59.45	1.6256	1.6343	1.6157	-.00535	.00609
	35.63	.96749	1.0019	.97047	-.03557	-.00308		46.27	1.3802	1.4856	1.4504	-.07637	-.05086		56.98	1.5290	1.5493	1.5318	-.01328	-.00183
	32.91	.85232	.87173	.84432	-.02277	.00939		41.36	1.1214	1.2428	1.2133	-.10826	-.08195		50.05	1.2580	1.2950	1.2803	-.02941	-.01773
	30.77	.74025	.77243	.74819	-.04347	-.01023		37.96	.95296	1.0769	1.0513	-.13006	-.10319		47.10	1.1468	1.1825	1.1691	-.03113	-.01945
	28.56	.64427	.67496	.65377	-.04764	-.01475		34.91	.82137	.93223	.91012	-.13497	-.10805		40.12	.88377	.91486	.90452	-.03518	-.02348
	24.51	.49071	.50828	.49231	-.03581	-.00326		31.71	.69740	.78643	.76777	-.12766	-.10090		35.71	.71487	.75097	.74246	-.05050	-.03859
	16.21	.24303	.23021	.22299	.05275	.08246		28.77	.58170	.65901	.64337	-.13290	-.10602		31.04	.57028	.58566	.57902	-.02697	-.01533
	12.18	.16563	.13148	.12734	.20618	.23118		17.96	.28418	.27075	.26433	.04726	.06985		18.18	.26044	.21458	.21215	.17609	.18542
	8.33	.11362	.06201	.06007	.45423	.47131		6.52	.10808	.03665	.03578	.66090	.66895		9.79	.14440	.06362	.06289	.55942	.56447
	0	.01926	0	0	1.0000	1.0000		0	.03561	0	0	1.0000	1.0000		0	.03990	0	0	1.0000	1.0000
5	46.19	1.6295	1.6292	1.5862	.00018	.02657	5	58.07	1.8185	1.8184	1.7826	.00005	.01974	5	70.28	1.8181	1.8437	1.8022	-.01408	.00875
	45.01	1.4691	1.5654	1.5241	-.06555	-.03744		56.71	1.7330	1.7644	1.7296	-.01812	.00196		68.59	1.8127	1.8031	1.7625	.00530	.02769
	44.30	1.4045	1.5214	1.4860	-.08323	-.05803		55.29	1.6500	1.7058	1.6723	-.03382	-.01352		66.74	1.7746	1.7558	1.7163	.01059	.03285
	42.41	1.2767	1.4236	1.3861	-.11506	-.08569		53.36	1.5603	1.6258	1.5938	-.04198	-.02147		64.45	1.7208	1.6934	1.6553	.01592	.03806
	40.63	1.1796	1.3270	1.2919	-.12496	-.09520		51.27	1.4457	1.5363	1.5060	-.06267	-.04171		61.98	1.6422	1.6214	1.5849	.01267	.03489
	35.77	.90016	1.0690	1.0407	-.18757	-.15613		49.31	1.3542	1.4519	1.4233	-.07215	-.05103		55.05	1.3931	1.3977	1.3663	-.00330	.01924
	33.56	.78926	.95660	.93134	-.21202	-.18002		46.36	1.2069	1.3225	1.2965	-.09578	-.07424		52.10	1.2909	1.2954	1.2663	-.00349	.01906
	29.51	.61382	.75953	.73947	-.23738	-.20470		42.96	1.0506	1.1728	1.1497	-.11631	-.09433		45.12	1.0303	1.0445	1.0210	-.01378	.00903
	27.19	.52673	.65304	.63580	-.23980	-.20707		39.91	.93361	1.0395	1.0191	-.11342	-.09157		40.71	.85804	.88527	.86536	-.03174	-.00853
	21.21	.33939	.40982	.39900	-.20752	-.17564		33.77	.68149	.77995	.76461	-.14448	-.12197		36.04	.70447	.71991	.70373	-.02192	.00105
	17.18	.24415	.27310	.26590	-.11857	-.08908		22.96	.35907	.38439	.37683	-.07052	-.04946		23.18	.34715	.32242	.31517	.07124	.09212
	13.33	.17961	.16640	.16200	.07355	.09805		11.52	.15361	.10064	.09865	.34483	.35779		14.79	.18814	.13547	.13241	.27995	.29622
	5.00	.05367	.02377	.02316	.55711	.56847		5.00	.06331	.01919	.01880	.69689	.70305		5.00	.07327	.01582	.01545	.78409	.78914
10	51.19	1.8178	1.8174	1.7772	.00022	.02233	10	63.07	1.8175	1.8174	1.7883	.00022	.01607	10	75.28	1.7535		1.8062		-.03005
	50.01	1.6617	1.7576	1.7187	-.05771	-.03430		61.71	1.7915	1.7731	1.7447	.01027	.02612		73.59	1.8178		1.7766		.02266
	49.30	1.5900	1.7207	1.6826	-.08220	-.05824		60.29	1.7334	1.7246	1.6970	.00508	.02100		71.74	1.8178	1.8123	1.7411	.00303	.04219
	47.41	1.4529	1.6230	1.5870	-.11708	-.09230		58.36	1.6572	1.6575	1.6310	-.00018	.01578		69.45	1.7929	1.7621	1.6929	.01718	.05578
	45.63	1.3432	1.5300	1.4960	-.13907	-.11376		56.27	1.5573	1.5814	1.5560	-.01548	.00083		66.98	1.7359	1.7025	1.6356	.01924	.05778
	40.77	1.0507	1.2765	1.2482	-.02149	-.18797		54.31	1.4745	1.5085	1.4844	-.02306	-.00671		60.05	1.5231	1.5088	1.4496	.00939	.04826
	38.56	.94025	1.1636	1.1378	-.23754	-.21010		51.36	1.3347	1.3953	1.3729	-.04540	-.02862		57.10	1.4285	1.4168	1.3612	.00819	.04711
	34.51	.76004	.96125	.93997	-.26474	-.23674		47.96	1.1907	1.2614	1.2412	-.05938	-.04241		50.12	1.1786	1.1834	1.1369	-.00407	.03538
	32.19	.66614	.84929	.83048	-.27479	-.24670		44.91	1.0716	1.1399	1.1217	-.06374	-.04675		45.71	1.0131	1.0300	.98956	-.01668	.02324
	26.21	.45674	.58426	.57132	-.27920	-.25086		38.77	.81687	.89645	.88207	.09742	-.07982		41.04	.85841	.86616	.83215	-.00903	.03059
	18.33	.26449	.29619	.28963	-.11985	-.09505		27.96	.46181	.50285	.49480	.08887	-.07144		28.18	.46181	.44829	.43069	.02928	.06739
	14.42	.19342	.18558	.18147	.04053	.06178		16.52	.21796	.18480	.18184	.15214	.16572		19.79	.27200	.23022	.22119	.15360	.18680
	10.00	.09951	.09025	.08825	.09306	.11315		10.00	.10725	.06894	.06783	.35720	.36755		10.00	-.11978	.06059	.05821		
15	56.19	1.8183	1.8180	1.7844	-.00016	.01864	15	68.07	1.8005		1.7951		.00300	15	80.28	1.6593		1.8100		-.09082
	55.01	1.7100	1.7680	1.7353	-.03392	-.01480		66.71	1.8182	1.8105	1.7602	.00423	.03190		78.59	1.7882		1.7901		-.00106
	54.30	1.6527	1.7369	1.7048	-.05095	-.03152		65.29	1.7889	1.7707	1.7214	.01017	.03773		76.74	1.8175		1.7650		.02889
	52.41	1.5283	1.6540	1.6235	-.08225	-.06229		63.36	1.7321	1.7146	1.6669	.01010	.03764		74.45	1.8175	1.8046	1.7292	.00710	.04858
	50.63	1.4200	1.5742	1.5450	-.10859	-.08803		61.27	1.6539	1.6499	1.6040	.00242	.03017		71.98	1.7845	1.7584	1.6849	.01426	.05581
	45.77	1.1422	1.3521	1.3272	-.18377	-.16197		56.36	1.4561	1.4875	1.4461	-.02156	.00687		65.05	1.6214	1.5984	1.5316	.01419	.05538
	43.56	1.0425	1.2510	1.2279	-.20000	-.17784		52.96	1.3182	1.3674	1.3294	-.03732	-.00850		62.10	1.5432	1.5186	1.4551	.01594	.05709
	39.51	.86761	1.0664	1.0457	-.22912	-.20642		49.91	1.2077	1.2561	1.2212	-.04008	-.01118		55.12	1.3160	1.3084	1.2537	.00578	.04734
	37.19	.77032	.96203	.94424	-.24887	-.22578		43.77	.96531	1.0267	.99817	-.06360	-.03404		50.71	1.1596	1.1649	1.1162	-.00457	.03743
	31.21	.55542	.70746	.69439	-.27374	-.25021		32.96	.58741	.63537	.61770	-.08165	-.05157		46.04	1.0057	1.0072	.96513	-.00149	.04034
	27.18	.43288	.54967	.53951	-.26980	-.24633		27.15	.42868	.44682	.43439	-.04232	-.01332		33.19	.58905	.58245	.55810	.01120	.05254
	19.42	.25369	.29106	.28569	-.14731	-.12614		27.52	.30047	.28866	.28062	.03931	.06606		24.79	.36119	.34167	.32739	.05404	.09358
	15.00	.15271	.17643	.17317	-.15533	-.01340		15.00	.16616	.14375	.13975	.15590	.15894		15.00	.16571	.13026	.12481	.21393	.24682
20	61.19	1.8176	1.8174	1.7897	.00011	.01529	20	73.07	1.7619		1.8007		-.02202	20	85.28	1.5702		1.8136		-.15501
	60.01	1.7728	1.7761	1.7492	-.00186	.01331		71.71	1.8181		1.7739		.02431		83.95	1.7387		1.8032		-.03710
	59.30	1.7335	1.7503	1.7238	-.00969	.00560		70.29	1.8138	1.8065	1.7436	.00402	.03870		79.45	1.8171		1.7648		.02878
	57.41	1.6268	1.6808	1.6553	-.03319	-.01752		68.36	1.7814	1.7615	1.7002	.01117	.04558		76.98	1.8171	1.8029	1.7334	.00781	.04606
	55.63	1.5299	1.6130	1.5885	-.05432	-.03830		66.27	1.7259	1.7085	1.6490	.01008	.04456		73.19	1.7681	1.7402	1.6731	.01578	.05373
	50.77	1.2728	1.4203	1.3988	-.11589	-.09899		61.36	1.5609	1.5704	1.5157	-.00609	.02896		70.05	1.7019	1.6781	1.6134	.01398	.05200
	48.56	1.1728	1.3307	1.3105	-.12464	-.11741		57.96	1.4363	1.4650	1.4140	-.01998	.01553		67.10	1.6339	1.6116	1.5495	.01365	.05166
	44.51	.99858	1.1637	1.1461	-.16545	-.14773		54.91	1.3306	1.3651	1.3176	-.02593	.00977		60.12	1.4360	1.4277	1.3727	.00578	.04408
	42.19	.90594	1.0675	1.0513	-.17833	-.16045		48.77	1.0967	1.1476	1.1077	-.04641	-.01003		55.71	1.2902	1.2966	1.2466	-.00496	.03379
	36.21	.68324	.82643	.81388	-.20957	-.19121		37.96	.71364	.77153	.74468	-.08112	-.04350		51.04	1.1437	1.1481	1.1039	-.00385	.03480
	32.18	.54888	.67160	.66141	-.22358	-.20502		32.15	.54504	.57726	.55716	-.05911	-.02224		38.19	.72156	.72579	.69780	-.00586	.03293
	28.33	.44398	.53325	.52516	-.20107	-.18285		26.52	.39782	.40633	.39218	-.02139	.01418		29.79	.47523	.46859	.45053	.01397	.05197
	20.00	.22312	.27693	.27230	-.24117	-.22042		20.00	.24082	.23848	.23017	.00972	.04422		20.00	.24362	.22218	.21360	.08801	.12322
25	66.19	1.8187		1.7964		.01226	25	78.07	1.7024		1.8054		-.06050	25		1.4945		1.8178		-.21633
	65.01	1.8187	1.8018	1.7635	.00929	.03035		76.71	1.7966		1.7865		.05622		88.59	1.6764		1.8167		-.08369
	64.30	1.7939	1.7805	1.7427	.00747	.02854		75.29	1.8174		1.7644		.02916		86.74	1.7584		1.8119		-.03043
	62.41	1.7195	1.7228	1.6862	-.00192	.01937		73.36	1.8112	1.7951	1.7315	.00889	.04400		81.98	1.8086		1.8008		.00431
	60.63	1.6390	1.6656	1.6302	-.01623	-.00537		71.27	1.7807	1.7536	1.6915	.01522	.05009		78.19	1.8043	1.7852	1.7416	-.01059	.03475
	55.77	1.4077	1.4989	1.4671	-.06479	-.04220		66.36	1.6571	1.6411	1.5830	.00966	.04472		75.05	1.7572	1.7394	1.6968	.01013	.03437
	53.56	1.3141	1.4195	1.3894	-.08021	-.05730		62.96	1.5501	1.5514	1.4964	-.00084	.03464		72.10	1.7082	1.6874	1.6461	.01218	.03635
	47.19	1.0475	1.1800	1.1549	-.12649	-.10253		59.91	1.4516	1.4640	1.4122	-.00854	.02714		65.12	1.5404	1.5335	1.4960	.00448	.02882
	41.21	.82246	.95209	.93188	-.15761	-.13304		53.77	1.2351	1.2673	1.2224	-.02607	.01028		60.71	1.4106	1.4176	1.3829	-.00496	.01964
	37.18	.67925	.80099	.78399	-.17923	-.15420		42.96	.85284	.90830	.87615	-.06454	-.02733		56.04	1.2716	1.2817	1.2504	-.00794	.01667
	33.33	.57014	.66219	.64813	-.16145	-.13679		37.15	.67486	.71309	.68785	-.05665	-.01925		43.19	.85333	.87265	.85129	-.00264	.00239
	29.42	.45110	.52902	.51780	-.17273	-.14786		31.52	.50911	.53430	.51540	-.04948	-.01235		34.79	.59062	.60642	.59158	-.02675	-.00163
	25.00	.31657	.39168	.38336	-.23726	-.21098		25.00	.34418	.34923	.33687	-.01467	.02124		25.00	.34261	.33282	.32468	.02857	.05233

a,b See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(c) Circular arc bodies - lower surface - Concluded

$\theta_{le} = 78^\circ$							$\theta_{le} = 90^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (b)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (b)
0	77.04	1.8190	1.8189	1.8055	0.00005	0.00742	0	89.91	1.8176	1.8179	1.8176	-0.00017	0
	75.05	1.7967	1.7879	1.7747	.00490	.01224		87.90	1.8176	1.8152	1.8152	.00132	.00132
	73.02	1.7657	1.7519	1.7390	.00782	.01512		84.53	1.8042	1.8011	1.8011	.00172	.00172
	66.70	1.6364	1.6157	1.6037	.01265	.01998		76.64	1.7181	1.7204	1.7204	-.00134	-.00134
	60.39	1.4588	1.4523	1.4416	.00446	.01179		73.06	1.6582	1.6634	1.6634	-.00314	-.00314
	55.70	1.3029	1.3071	1.2974	-.00322	.00422		69.05	1.5685	1.5852	1.5852	-.01065	-.01065
	51.43	1.1581	1.1709	1.1623	-.01105	-.00363		63.31	1.4311	1.4511	1.4511	-.01398	-.01398
	47.83	1.0442	1.0522	1.0445	-.00766	-.00029		59.47	1.3242	1.3485	1.3485	-.01835	-.01835
	42.90	.88394	.88753	.88098	-.00406	.00335		54.59	1.1845	1.2072	1.2072	-.01916	-.01916
	36.49	.68963	.67714	.67214	.01811	.02536		44.00	.87192	.87708	.87708	-.00592	-.00592
	30.85	.53554	.50366	.49993	.05953	.06649		36.11	.62711	.63149	.63149	-.00698	-.00698
	9.06	.14198	.04757	.04720	.66495	.66756		13.80	.17350	.10342	.10342	.40392	.40392
	0	.04235	0	0	1.0000	1.0000		0	.04591	0	0	1.0000	1.0000
5	82.04	1.8105		1.8104		.00006	5	94.91	1.7989		1.8044		-.00306
	80.05	1.8185	1.8185	1.7908	0	.01523		92.90	1.8117		1.8131		-.00077
	78.02	1.8123	1.7937	1.7663	.01026	.02538		89.53	1.8178	1.8177	1.8177	.00006	.00006
	71.70	1.7289	1.6897	1.6639	.02267	.03760		85.71	1.8062	1.8077	1.8077	-.00083	-.00083
	65.39	1.5193	1.5492	1.5256	.01906	.03400		81.64	1.7800	1.7793	1.7793	.00039	.00039
	60.70	1.4409	1.4255	1.4038	.01069	.02575		74.05	1.6648	1.6805	1.6805	-.00943	-.00943
	56.43	1.3055	1.3014	1.2816	.00314	.01831		68.31	1.5491	1.5697	1.5697	-.01330	-.01330
	52.83	1.1986	1.1903	1.1722	.00692	.02203		64.47	1.4540	1.4801	1.4801	-.01795	-.01795
	47.90	1.0348	1.0319	1.0162	.00280	.01701		59.59	1.3279	1.3519	1.3519	-.01807	-.01807
	41.49	.83891	.82249	.80994	.01957	.03453		49.00	1.0238	1.0354	1.0354	-.01133	-.01133
	35.85	.66956	.64259	.63315	.04028	.05438		41.11	.76661	.78607	.78607	-.02538	-.02538
	14.06	.18934	.11073	.10904	.41518	.42410		18.80	.25046	.18880	.18880	.24619	.24619
	5.00	.07747	.01424	.01402	.81619	.81903		5.00	.08288	.01382	.01382	.83325	.83325
10	87.04	1.7380		1.8163		-.04505	10	99.91	1.7530		1.7738		-.01187
	85.05	1.7992		1.8076		-.00467		97.90	1.7775		1.7832		-.03207
	83.02	1.8190	1.8312	1.7943	-.00671	-.01358		90.71	1.8175	1.8172	1.8172	.00017	.00017
	80.27	1.8172	1.8055	1.7692	.00644	.02641		86.64	1.8101	1.8110	1.8110	-.00050	-.00050
	76.70	1.7875	1.7743	1.7386	.00738	.02736		83.06	1.7898	1.7910	1.7910	-.00067	-.00067
	70.39	1.6743	1.6492	1.6159	.00150	.03488		79.05	1.7394	1.7519	1.7519	-.00719	-.00719
	65.70	1.5612	1.5439	1.5128	.01108	.03100		73.31	1.6522	1.6677	1.6677	-.00938	-.00938
	57.83	1.3373	1.3319	1.3050	.00404	.02415		69.47	1.5742	1.5939	1.5939	-.01251	-.01251
	52.90	1.1814	1.1824	1.1586	-.00085	.01930		64.59	1.4600	1.4827	1.4827	-.01555	-.01555
	46.49	.99343	.97744	.95774	.01610	.03593		54.00	1.1663	1.1896	1.1896	-.01998	-.01998
	40.85	.81038	.79518	.87021	.01876	-.07383		46.11	.92740	.94415	.94415	-.01806	-.01806
	19.03	.26369	.19834	.19434	.24783	.26300		23.80	.33772	.29598	.29598	.12359	.12359
	10.00	.12392	.05604	.05492	.54777	.55681		10.00	.13256	.05480	.05480	.58660	.58660
15	92.04	1.6225		1.8162		-.11938	15	104.91	1.6839		1.6984		-.00861
	92.05	1.7374		1.8185		-.04668		102.90	1.7167		1.7282		-.00670
	88.02	1.7911		1.8163		-.01407		99.53	1.7613		1.7690		-.00437
	81.70	1.8185	1.8016	1.7806	.00929	.02084		91.64	1.8189	1.8174	1.8174	.00082	.00082
	78.57	1.7948	1.7677	1.7471	.01510	.02658		88.06	1.8189	1.8168	1.8168	.00115	.00115
	75.39	1.7511	1.7228	1.7027	.01616	.02764		84.05	1.7985	1.7993	1.7993	-.00044	-.00044
	70.70	1.6675	1.6390	1.6198	.01709	.02861		78.31	1.7477	1.7443	1.7443	.00195	.00195
	62.83	1.4740	1.4564	1.4394	.01194	.02347		74.47	1.6895	1.6884	1.6884	.00065	.00065
	57.90	1.3291	1.3204	1.3050	.00655	.01813		69.51	1.5947	1.5976	1.5976	-.00182	-.00182
	51.49	1.1419	1.1264	1.1133	.01357	.02505		59.00	1.3248	1.3364	1.3364	-.00876	-.00876
	45.85	.96148	.94726	.93622	.01479	.02627		51.11	1.0913	1.1022	1.1022	-.00999	-.00999
	24.06	.35848	.30598	.30242	.14645	.15638		28.80	.45542	.42215	.42215	.07305	.07305
	15.00	.17059	.12326	.12182	.27745	.28589		15.00	.17617	.12185	.12185	.30834	.30834
20	97.04	1.4640		1.7911		-.02234	20	109.91	1.5903		1.6076		-.01088
	95.05	1.6404		1.8043		-.09991		107.90	1.6327		1.6468		-.00868
	93.02	1.7303		1.8134		-.04805		100.71	1.7568		1.7557		.00057
	86.70	1.8184		1.8124		.00330		93.06	1.8186	1.8134	1.8134	.00286	.00286
	83.60	1.8184	1.8093	1.7956	.00500	.01254		89.05	1.8136	1.8181	1.8181	-.00248	-.00248
	80.39	1.7940	1.7812	1.7676	.00713	.01472		83.31	1.7899	1.7939	1.7940	-.00223	-.00223
	75.70	1.7390	1.7205	1.7075	.01064	.01811		79.47	1.7550	1.7578	1.7578	-.00160	-.00160
	67.83	1.5846	1.5715	1.5595	.00827	.01584		74.59	1.6864	1.6901	1.6901	-.00219	-.00219
	62.90	1.4615	1.4521	1.4410	.00643	.01403		64.00	1.4599	1.4691	1.4691	-.00626	-.00626
	56.49	1.2809	1.2736	1.2640	.00570	.01319		56.11	1.2441	1.2534	1.2534	-.00742	-.00742
	50.85	1.1065	1.1120	1.0936	.00407	.01166		33.80	.57656	.56278	.56278	.00656	.00656
	29.06	.46776	.43249	.42920	.07540	.08244		22.04	.33389	.25588	.25588	.23364	.23364
	20.00	.25463	.21435	.21272	.15819	.16459		20.00	.26465	.21274	.21274	.19615	.19615
25	102.04	1.2941		1.7389		-.34371	25	114.91	1.4797		1.4952		-.01048
	100.05	1.5237		1.7625		-.15672		112.90	1.5272		1.5425		-.00992
	98.02	1.6442		1.7825		-.08411		109.53	1.6009		1.6146		-.00856
	91.70	1.7954		1.8163		-.01164		101.64	1.7447		1.7439		.00046
	88.57	1.8179		1.8168		.00061		94.05	1.8084		1.8087		-.00017
	85.39	1.8129	1.8111	1.8061	.000993	.00374		88.31	1.8178	1.8162	1.8162	.00088	.00088
	80.70	1.7847	1.7753	1.7704	.00527	.00801		84.47	1.8028	1.8009	1.8009	.00105	.00105
	72.82	1.6711	1.6641	1.6594	.00419	.00700		79.59	1.7597	1.7584	1.7584	.00074	.00074
	67.90	1.5657	1.5649	1.5606	.00051	.00326		69.00	1.5778	1.5843	1.5843	-.00412	-.00412
	61.49	1.4058	1.4074	1.3127	-.00114	.06623		61.11	1.3847	1.3937	1.3937	-.00650	-.00650
	55.85	1.2370	1.2484	1.2450	-.00922	-.00647		38.80	.71465	.71372	.71372	.00130	.00130
	34.06	.58832	.57198	.57042	.02777	.03043		27.04	.44090	.37552	.37552	.14829	.14829
	25.00	.35181	.32559	.32470	.07453	.07706		25.00	.36465	.32468	.32468	.10961	.10961

[a,b] See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Continued

(d) Circular arc bodies - upper surface

$\theta_{le} = 42°$							$\theta_{le} = 54°$							$\theta_{le} = 66°$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)
0	40.43	1.1724	1.1725	1.2027	-0.00009	-0.02584	0	52.44	1.7737	1.7734	1.7454	0.00017	0.01596	0	63.64	1.7617	1.7615	1.7491	0.00011	0.00727
	39.24	1.1241	1.1151	1.1438	.00801	-.01753		50.53	1.6243	1.6822	1.6556	-.03565	-.01927		61.49	1.6839	1.6942	1.6821	-.00612	.00107
	38.51	1.0938	1.0810	1.1088	.01170	-.01371		48.66	1.5035	1.5865	1.5660	-.05520	-.04157		60.01	1.6280	1.6463	1.6345	-.01124	-.00399
	34.99	.92910	.91634	.93990	.01384	-.01162		45.40	1.3242	1.4310	1.4084	-.08065	-.06359		54.33	1.4190	1.4483	1.4379	-.02065	-.01332
	32.92	.83437	.82318	.84433	.01341	-.01194		43.19	1.2034	1.3218	1.3009	-.09839	-.08102		49.04	1.2112	1.2511	1.2422	-.03294	-.02559
	30.71	.73467	.72731	.74601	.01002	-.01544		38.30	.96695	1.0842	1.0671	-.12126	-.10357		46.29	1.1146	1.1463	1.1381	-.02844	-.02108
	27.76	.60836	.60502	.62055	.00549	-.02004		35.32	.84044	.94327	.92837	-.12235	-.10462		40.12	.88620	.91103	.90464	-.02802	-.02067
	24.51	.48762	.47999	.49231	.01565	-.00962		31.59	.70249	.77424	.76199	-.10214	-.08470		35.76	.72216	.74432	.74401	-.03069	-.03027
	16.20	.24303	.21699	.22255	.10715	.08427		28.76	.58869	.65371	.64337	-.11045	-.09288		31.33	.58182	.59338	.58913	-.01987	-.01256
	12.18	.16440	.12416	.12734	.24477	.22543		17.91	.28608	.26712	.26291	.06628	.08099		18.37	.27806	.21787	.21631	.21646	.22207
	4.42	.06285	.01653	.01695	.73699	.73031		6.49	.10935	.03599	.03542	.67087	.67609		9.94	.14197	.06531	.06484	.53997	.54328
	0	.02570	0	0	1.0000	1.0000		0	.04514	0	0	1.0000	1.0000		0	.04659	0	0	1.0000	1.0000
5	35.43	.91207	.91225	1.0222	-.00020	-.12075	5	47.44	1.4669	1.4666	1.5069	.00020	-.02727	5	58.64	1.6204	1.6202	1.5885	.00012	.01969
	34.24	.87886	.85893	.90588	.02268	-.03074		45.53	1.3391	1.3771	1.4147	-.02838	-.05646		56.49	1.5297	1.5447	1.5145	-.00981	.01520
	33.51	.85505	.82750	.87212	.03222	-.01996		43.66	1.2354	1.2780	1.3240	-.03448	-.07172		55.01	1.4675	1.4918	1.4624	-.01656	.00361
	31.39	.75605	.73601	.77572	.02651	-.02602		40.40	1.0815	1.1358	1.1670	-.05021	-.07906		49.33	1.2498	1.2785	1.2533	-.02296	-.00280
	29.99	.69590	.67782	.71491	.02598	-.027317		38.19	.96876	1.0333	1.0619	-.06662	-.09614		44.04	1.3046	1.0736	1.0528	-.03770	-.019301
	27.92	.61320	.59491	.62733	.02983	-.02304		36.11	.87179	.93939	.96487	-.07754	-.10677		41.29	.94268	.96736	.94843	-.02618	-.006301
	22.76	.43525	.40081	.42825	.07913	.01608		33.30	.75119	.81501	.83734	-.08496	-.11468		35.12	.72744	.73534	.72101	-.01086	.00884
	17.16	.28675	.23642	.24890	.17552	.13200		30.32	.64331	.68893	.70796	-.07091	-.10050		30.76	.57932	.58151	.56985	-.00378	.00211
	11.20	.16645	.10240	.10794	.38480	.35152		26.59	.52755	.54146	.55634	-.02637	-.05457		26.33	.45114	.43726	.42858	.03077	.05001
	7.18	.10442	.04245	.04471	.59347	.57183		12.91		.13512	.13866				13.37	.19600	.11878	.11649	.39398	.40566
	-.58	.02798						1.49	.05907	.00180	.00187	.96953	.9683		4.94	.09201	.01645	.01615	.82122	.82448
	-5.00	.000414						-5.00	.01349						-5.00	.01849				
10	30.43	.69342	.69356	.73358	-.00020	-.05792	10	42.44	1.1847	1.1844	1.2651	.00025	-.06787	10	53.64	1.4400	1.4398	1.4129	.00014	.01882
	29.24	.67312	.64469	.68273	.04224	-.01428		40.53	1.0861	1.0988	1.1732	-.01169	-.08020		51.49	1.3581	1.3593	1.3339	-.00088	.01782
	28.51	.64647	.61608	.65188	.04701	-.00836		38.66	1.0044	1.0111	1.0841	-.00667	-.07935		50.01	1.2944	1.3036	1.2788	-.00711	.01205
	26.39	.56525	.53377	.56487	.05569	.00067		37.65	.97537	.97060	1.0366	.00489	-.06278		44.33	1.0828	1.0844	1.0638	-.00148	.01755
	24.99	.51512	.48218	.51066	.06395	.00866		33.19	.77332	.77932	.83248	-.00776	-.07650		41.63	.97485	.98006	.96149	-.00534	.01370
	20.71	.37743	.33826	.35784	.10378	.05190		31.11	.69165	.69478	.74162	-.00453	-.07225		39.04	.86933	.88065	.86429	-.01302	.00580
	17.76	.29685	.25168	.26623	.15216	.10315		28.30	.59122	.58473	.62438	.01098	-.05609		36.29	.78200	.77760	.76318	.00563	.02407
	12.16	.18517	.12007	.12686	.35157	.31490		25.32	.49866	.47572	.50809	.04600	-.01891		30.12	.59158	.55904	.54857	.05501	.07270
	6.20	.09570	.03152	.03338	.67064	.65120		18.76	.31838	.26926	.28733	.15428	.09752		25.76	.45756	.41960	.41149	.08296	.10069
	2.18	.05510	.00392	.00414	.92886	.92486		7.91	.12903	.04935	.05261	.61753	.59227		8.37	.13919	.04700	.04616	.66233	.66837
	-5.58	.00351						-3.51	.02800						-.06	.05489				
	-10.00	-.01426						-10.00	-.00539						-10.00	-.00078				
15	25.43	.50788	.50803	.52760	-.00030	-.03883	15	37.44	.55016		1.0264		-.86564	15	48.64	1.2683	1.2680	1.2273	.00024	.03233
	24.24	.47537	.46403	.48231	.02386	-.01460		35.53	.88899	.88917	.93814	-.00520	-.05529		46.49	1.1645	1.1839	1.1458	-.01666	.01606
	23.51	.44766	.43852	.45511	.02042	-.01664		33.66	.78216	.80475	.85337	-.02888	-.09104		45.01	1.1058	1.1263	1.0897	-.01854	.01456
	21.39	.38239	.36617	.38031	.04242	.00544		30.40	.67104	.67408	.71137	-.00453	-.06010		39.33	.91586	.90444	.87510	.01247	.04450
	19.99	.35099	.32169	.33440	.08348	.04727		28.19	.60023	.58719	.61994	.02173	-.03284		36.63	.81018	.80155	.77558	.01065	.04271
	15.71	.24754	.20212	.20978	.18349	.15254		26.11	.54162	.51011	.53808	.05818	.00654		31.29	.63242	.60705	.58967	.04012	.07076
	12.76	.18966	.13450	.13959	.29084	.26400		20.32	.35969	.31733	.33438	.11777	.07037		28.45	.55789	.51093	.49444	.08417	.11373
	7.16	.10653	.04286	.04442	.59767	.58303		16.59	.28032	.21443	.22646	.23505	.19214		25.12	.46504	.40562	.39262	.12777	.15572
	1.20	.04680	.00121	.001254	.97415	.97321		13.76	.21988	.14907	.15717	.32204	.28520		16.33	.25979	.17806	.17226	.31460	.33693
	-2.82	.01909						2.91	.07886	.00682	.00716	.91352	.90921		3.37	.09119	.00776	.00802	.91490	.91205
	-10.58	-.00134						-8.51	.00535						-5.06	.02643				
	-15.00	-.00241						-15.00	-.01723						-15.00	-.01395				
20	20.43	.32802	.40880	.34862	-.24627	-.06280	20	32.44	.33612		.79936		-.13782	20	43.64	.61803		1.0376		-.60116
	19.24	.36422	.36395	.31072	.00074	.14689		30.53	.59208		.71684		-.21071		41.49	1.0138	1.0135	.95612	.00030	.05689
	18.51	.34950	.33829	.28840	.03207	.17482		28.66	.64583	.64609	.63900	-.00040	.00293		40.01	.93479	.95506	.90049	-.02168	.03669
	16.39	.28324	.26685	.22765	.05998	.19626		25.40	.50655	.51657	.51113	-.01978	-.00904		34.33	.72707	.73478	.69289	-.01060	.04701
	14.99	.24520	.22419	.19142	.08569	.21933		21.11	.37583	.36341	.36037	.03057	.04114		31.63	.63761	.63541	.59920	.00345	.06024
	10.71	.16115	.11599	.09882	.28024	.38678		18.30	.30863	.27680	.27388	.10313	.11259		29.04	.55550	.54406	.51334	.02059	.07590
	7.76	.11882	.06125	.05216	.48451	.56102		15.32	.25243	.19591	.19392	.22390	.23179		26.29	.48565	.45293	.42738	.06737	.11998
	2.16	.06115	.00480	.00406	.92150	.93361		11.59	.19562	.11320	.11213	.42133	.42680		20.12	.34227	.27324	.25779	.20168	.24682
	-3.88	.01925						8.76	.15103	.06522	.06443	.56817	.57340		11.33	.17866	.08920	.08409	.50073	.52933
	-7.82	-.00007						-2.09	.04535						-1.63	.05305				
	-15.58	-.02185						-13.51	-.01061						-10.06	.00526				
	-20.00	-.02879						-20.00	-.02539						-20.00	-.02311				
25	15.43	.16158		.20254		-.25350	25	27.44	.22042		.58993		-.16764	25	38.64	.39894		.84942		-1.1292
	14.24	.25148		.17314		.31152		25.53	.35559		.51597		-.45103		36.49	.58573		.77040		-.31528
	13.51	.25148	.25171	.15616	-.00091	.37904		23.66	.42654	.43934	.44738	-.03001	-.04886		35.01	.66105	.67500	.71706	-.02110	-.08473
	11.39	.21552	.17951	.11152	.16708	.48255		20.40	.38067	.33394	.33753	.12276	.11333		32.37	.64451	.58751	.62447	.08844	.03109
	9.99	.18700	.13846	.08611	.25957	.53952		18.19	.32623	.26765	.27072	.17957	.17016		29.33	.56674	.49200	.52171	.13188	.07945
	5.71	.11446	.04571	.02833	.60065	.75249		16.11	.27791	.21180	.21389	.23788	.23036		26.63	.48897	.41197	.43771	.15747	.10483
	2.76	.07727	.01074	.006634	.86101	.91415		13.30	.22226	.14545	.14701	.34559	.33857		21.29	.35180	.27010	.28721	.23223	.18360
	-2.84	.03077						10.32	.17394	.08814	.08914	.49327	.48752		15.12	.23667	.13943	.14822	.41087	.37373
	-8.80	-.00054						6.59	.12807	.03612	.03658	.71797	.71457		6.33	.11971	.02495	.02648	.79158	.77880
	-12.82	-.01356						-7.09	.01504						-6.63	.02418				
	-20.58	-.02726						-18.51	-.01988						-15.06	-.00968				
	-25.00	-.02838						-25.00	-.02906						-25.00	-.02879				

[a], [c] See footnotes at end of table.

TABLE II.- MEASURED AND THEORETICAL VALUES OF PRESSURE COEFFICIENTS FOR

TWO-DIMENSIONAL AERODYNAMICALLY BLUNT BODIES - Concluded

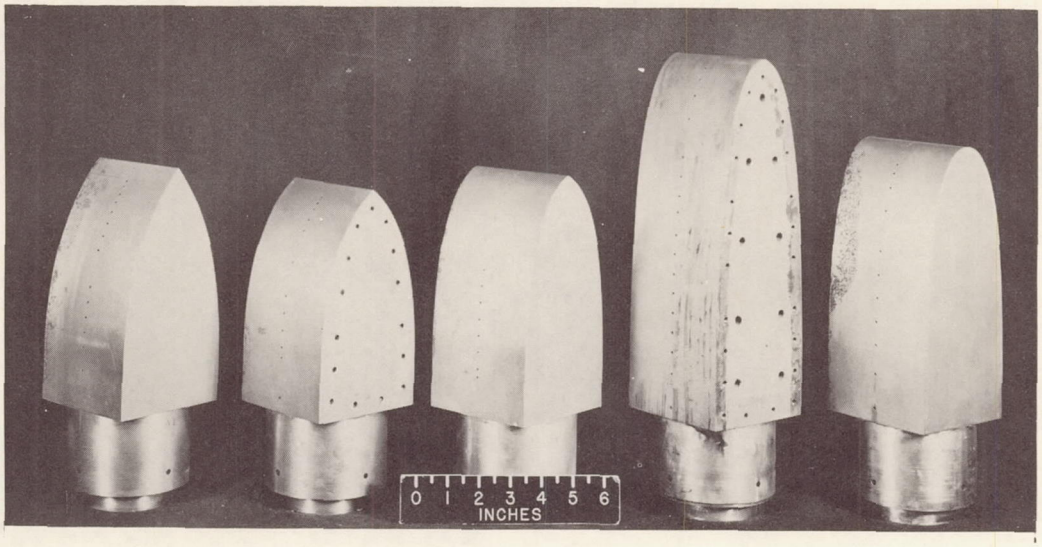
(d) Circular arc bodies - upper surface - Concluded

$\theta_{le} = 78^\circ$							$\theta_{le} = 90^\circ$						
α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)	α, deg	δ, deg	$C_{p,meas}$	C_p (a)	C_p (c)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (a)	$\frac{C_{p,meas} - C_p}{C_{p,meas}}$ (c)
0	75.11	1.8010	1.8012	1.7758	-0.00011	0.01399	0	87.45	1.8164	1.8164	1.8140	0	0.00132
	72.89	1.7651	1.7613	1.7365	.00215	.01620		85.13	1.8103	1.8069	1.8045	.00188	.00320
	70.46	1.7181	1.7128	1.6887	.00308	.01711		82.07	1.7864	1.7853	1.7830	.00062	.00190
	67.10	1.6488	1.6363	1.6133	.00758	.02153		78.73	1.7510	1.7505	1.7482	.00029	.00160
	60.56	1.4718	1.4627	1.4421	.00618	.02018		71.05	1.6173	1.6281	1.6259	-.00668	-.00532
	57.11	1.3604	1.3599	1.3408	.00037	.01441		61.88	1.4006	1.4158	1.4138	-.01085	-.00950
	49.76	1.1135	1.1238	1.1080	-.00925	.00494		57.39	1.2767	1.2912	1.2897	-.01136	-.01003
	43.16	.92354	.90250	.88980	.02278	.03653		53.40	1.1546	1.1730	1.1715	-.01594	-.01464
	37.08	.72057	.70109	.69124	.02703	.04070		43.82	.86764	.87242	.87138	-.00551	-.00418
	31.47	.55906	.52544	.51805	.06014	.07336		36.02	.64176	.62931	.62858	.01940	.02071
	9.82	.15683	.05607	.05526	.64248	.64764		14.27	.19121	.11053	.11043	.42194	.42273
	0	.05349	0	0	1.0000	1.0000		0	.05446	0	0	1.0000	1.0000
5	70.11	1.7277	1.7279	1.6812	-.00012	.02691	5	82.45	1.7782	1.7800	1.7863	-.00101	-.01041
	67.89	1.6757	1.6769	1.6318	-.00716	.02620		80.13	1.7520	1.7581	1.7642	-.00348	-.00696
	65.46	1.6127	1.5908	1.5733	.01358	.02443		77.07	1.7154	1.7205	1.7266	-.00297	-.00652
	62.10	1.5330	1.5260	1.4849	.00457	.03138		73.73	1.6624	1.6691	1.6749	-.00403	-.00752
	55.56	1.3352	1.3292	1.2931	.00449	.03153		66.05	1.4948	1.5128	1.5181	-.01204	-.01559
	52.11	1.2091	1.2171	1.1841	-.00662	.02068		60.96	1.3632	1.3846	1.3894	-.01570	-.01922
	44.76	.95943	.96898	.94265	-.00995	.017490		52.39	1.1219	1.1364	1.1406	-.01292	-.01667
	38.16	.76474	.74611	.72580	.02436	.05092		43.51	.85802	.85875	.86157	-.00085	-.00414
	32.08	.58303	.55122	.53629	.05456	.08017		38.82	.71603	.71167	.71428	.00609	.00244
	26.47	.44088	.38809	.37774	.11974	.14321		31.02	.51311	.48093	.48085	.06272	.06287
	4.82	.10467	.01377	.01342	.86844	.87179		9.27	.13712	.04696	.04717	.65753	.65672
	-5.00	.02494						-5.00	.02499				
10	65.11	1.6038	1.6040	1.5644	-.00012	.02457	10	77.45	1.7143	1.7143	1.7318	0	-.01021
	62.89	1.5432	1.5441	1.5064	-.00058	.02385		75.13	1.6756	1.6808	1.6979	-.00310	-.01331
	60.46	1.4740	1.4755	1.4391	-.00102	.02368		72.07	1.6166	1.6287	1.6453	-.00748	-.01775
	57.10	1.3948	1.3740	1.3402	.01491	.03915		68.73	1.5546	1.5626	1.5784	-.00515	-.01531
	50.56	1.1858	1.1627	1.1339	.01948	.04377		61.05	1.3555	1.3777	1.3917	-.01638	-.02671
	43.34	.93530	.91787	.89553	.01864	.04252		55.96	1.2192	1.2357	1.2481	-.01353	-.02379
	36.37	.70586	.68527	.66856	.02917	.05284		47.39	.97286	.97439	.98453	-.00157	-.01200
	33.16	.62237	.58333	.56883	.06273	.08603		43.40	.84447	.84942	.85809	-.00586	-.01613
	27.08	.46406	.40401	.39400	.12940	.15097		38.51	.71119	.69777	.70468	.01887	.00915
	21.47	.34099	.26103	.25470	.23449	.25306		33.82	.57974	.57726	.56308	.00424	.02874
	-.18	.06455						26.02	.39853	.34615	.34978	.13143	.12232
	-10.00	.00364						-10.00	.00431				
15	60.11	1.4596	1.4597	1.4290	-.00007	.02096	15	72.45	1.6341	1.6341	1.6524	0	-.01120
	57.89	1.3997	1.3930	1.3641	.00479	.02543		70.13	1.5839	1.5899	1.6076	-.00379	-.01496
	55.46	1.3285	1.3178	1.2900	.00805	.02898		67.07	1.5139	1.5246	1.5417	-.00707	-.01836
	52.10	1.2517	1.2091	1.1837	.03403	.05433		63.73	1.4440	1.4455	1.4622	-.00104	-.01260
	45.56	1.0445	.99012	.96920	.05206	.07209		56.05	1.2297	1.2369	1.2507	-.00586	-.01708
	42.11	.91903	.87337	.85489	.04968	.06979		50.96	1.0879	1.0846	1.0966	.00303	-.00799
	38.34	.79294	.74701	.73158	.05792	.07736		46.88	.96905	.95783	.96837	.01158	.00070
	31.37	.57758	.52610	.51519	.08913	.10802		38.40	.71456	.69353	.70130	.02943	.01856
	28.16	.50330	.43268	.42346	.14031	.15863		33.51	.58483	.54808	.55400	.06236	.05272
	16.47	.25361	.15603	.15282	.38476	.39742		28.82	.46998	.41763	.42238	.11139	.10128
	-5.18	.03451						21.02	.30960	.23121	.23385	.25320	.24467
	-15.00	-.01018						-15.00	-.00689				
20	55.11	1.2715	1.2717	1.2792	-.00016	-.00606	20	67.45	1.5304	1.5304	1.5503	0	-.01300
	52.89	1.2234	1.2017	1.2091	.01774	.01169		65.13	1.4686	1.4770	1.4961	-.00572	-.01737
	50.46	1.1515	1.1241	1.1307	.02380	.01806		62.07	1.3925	1.4005	1.4188	-.00575	-.01889
	47.10	1.0859	1.0141	1.0201	.06612	.06059		58.75	1.3158	1.3109	1.3279	.00372	-.00920
	40.56	.88588	.79926	.80387	.09778	.09257		51.05	1.0881	1.0852	1.0993	.00267	-.01029
	37.11	.76401	.66816	.69210	.12546	.09412		41.88	.81674	.79973	.81000	.02083	.00825
	33.34	.64526	.57065	.57428	.11563	.11000		37.39	.68885	.66141	.67021	.03983	.02706
	29.76	.53588	.46580	.46843	.13078	.12587		33.40	.57843	.54372	.55080	.06001	.04777
	23.16	.38838	.29248	.29409	.24692	.24278		28.51	.46240	.40895	.41410	.11560	.10446
	11.47	.17651	.07469	.07518	.57685	.57407		16.02	.22410	.13660	.15660	.39045	.30120
	-10.18	.01251						-5.73	.02759				
	-20.00	-.01912						-20.00	-.02063				
25	50.11	1.0198	1.0200	1.1193	-.00020	-.09757	25	62.45	1.4028	1.4028	1.4288	0	-.01853
	47.89	.99127	.95316	1.0464	.00384	-.05562		60.13	1.3384	1.3420	1.3668	-.00269	-.02122
	45.46	.92507	.88023	.96589	.04847	-.04413		57.07	1.2522	1.2571	1.2805	-.00391	-.02260
	42.10	.86680	.77860	.85453	.08820	.01419		53.73	1.1722	1.1601	1.1815	.01032	-.00793
	38.91	.79212	.68358	.75001	.13702	.05316		46.05	.93903	.92498	.94211	.01496	-.00322
	35.56	.69194	.58606	.64303	.15302	.07068		40.96	.78965	.76708	.78108	.02858	.01085
	32.11	.58690	.48963	.53719	.16574	.08470		32.39	.55715	.51191	.52155	.08120	.06390
	28.34	.48732	.39020	.42840	.19929	.12091		28.40	.45715	.40371	.41117	.11690	.10058
	21.37	.32217	.22994	.25244	.28628	.21644		23.51	.35528	.28412	.28924	.20029	.18588
	6.47	.11877	.02197	.02414	.81502	.79675		18.82	.26590	.18565	.18916	.30181	.28860
	-15.18	-.00642						-10.73	.00565				
	-25.00	-.02719						-25.00	-.02723				

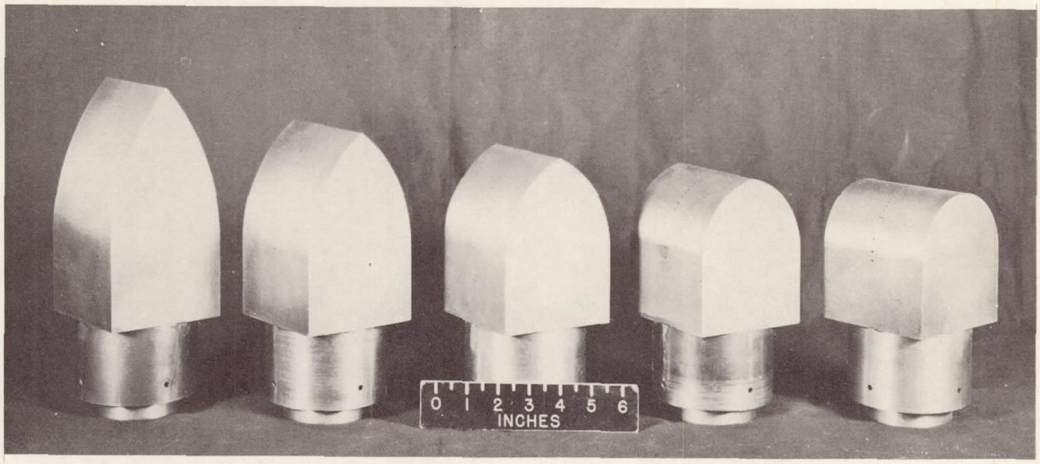
[a]Computed by using generalized Newtonian theory with the maximum pressure coefficient at its actual location on each surface, $C_p = C_{p,max} \frac{\sin^2\delta}{\sin^2\delta_{max}}$.

[b]Computed by using generalized Newtonian theory with the lower-surface maximum pressure coefficient at its geometric location, $C_p = C_{p,max} \frac{\sin^2\delta}{\sin^2\delta_{max,geom}}$.

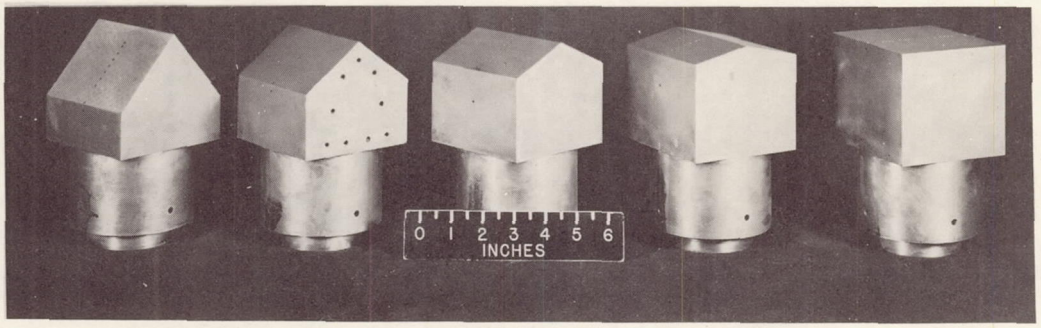
[c]Computed by using generalized Newtonian theory with both the maximum pressure coefficient and leading-edge angle at $\alpha = 0^\circ$, $C_p = C_{p,max(\alpha=0^\circ)} \frac{\sin^2\delta}{\sin^2\delta_{le(\alpha=0^\circ)}}$.



(a) Parabolic arc models.



(b) Circular arc models.



(c) Wedge models.

L-63-83

Figure 1.- Photograph of two-dimensional aerodynamically blunt bodies.

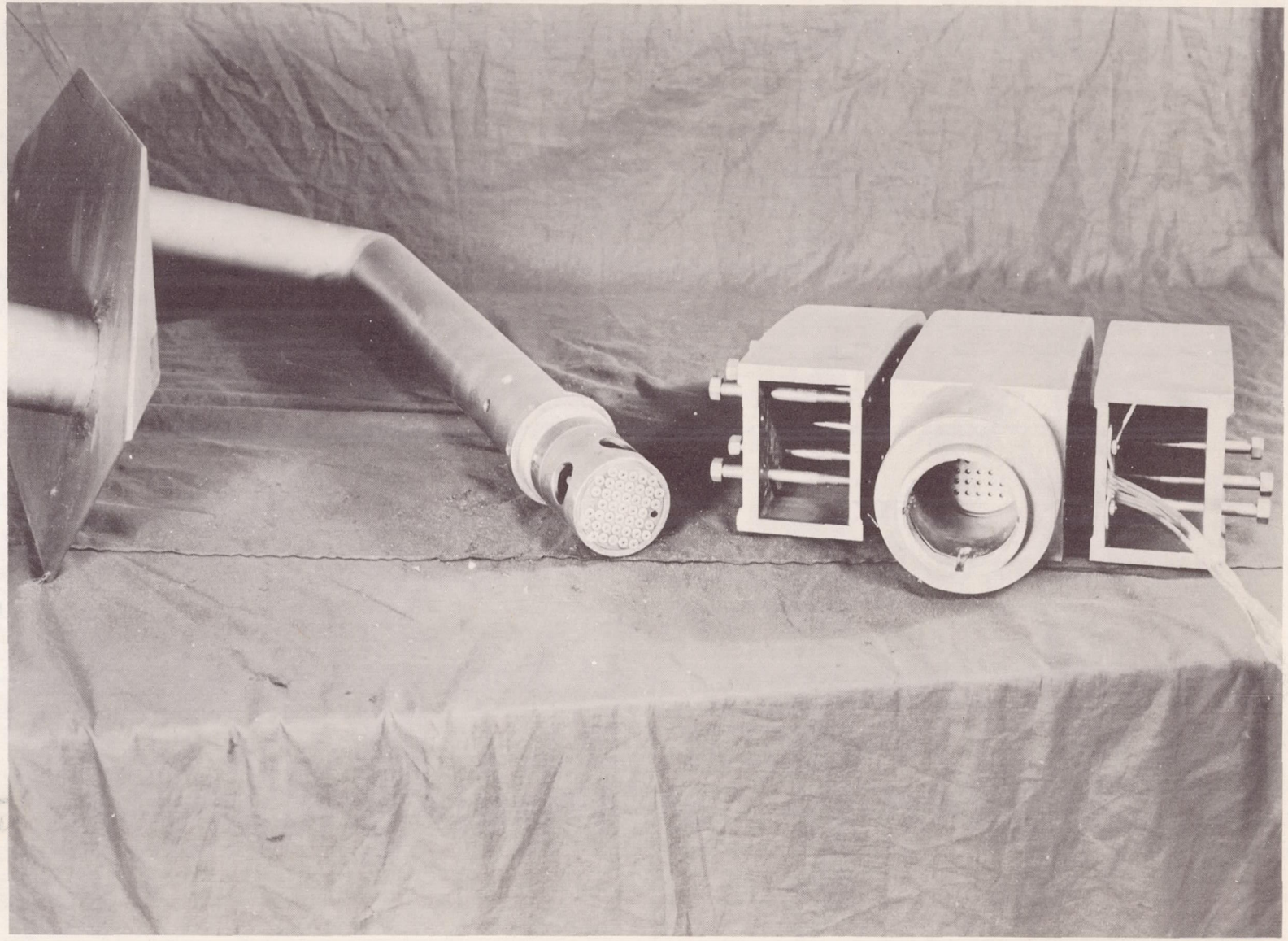


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Figure 2.- Photograph of 78° parabola with extensions and support.

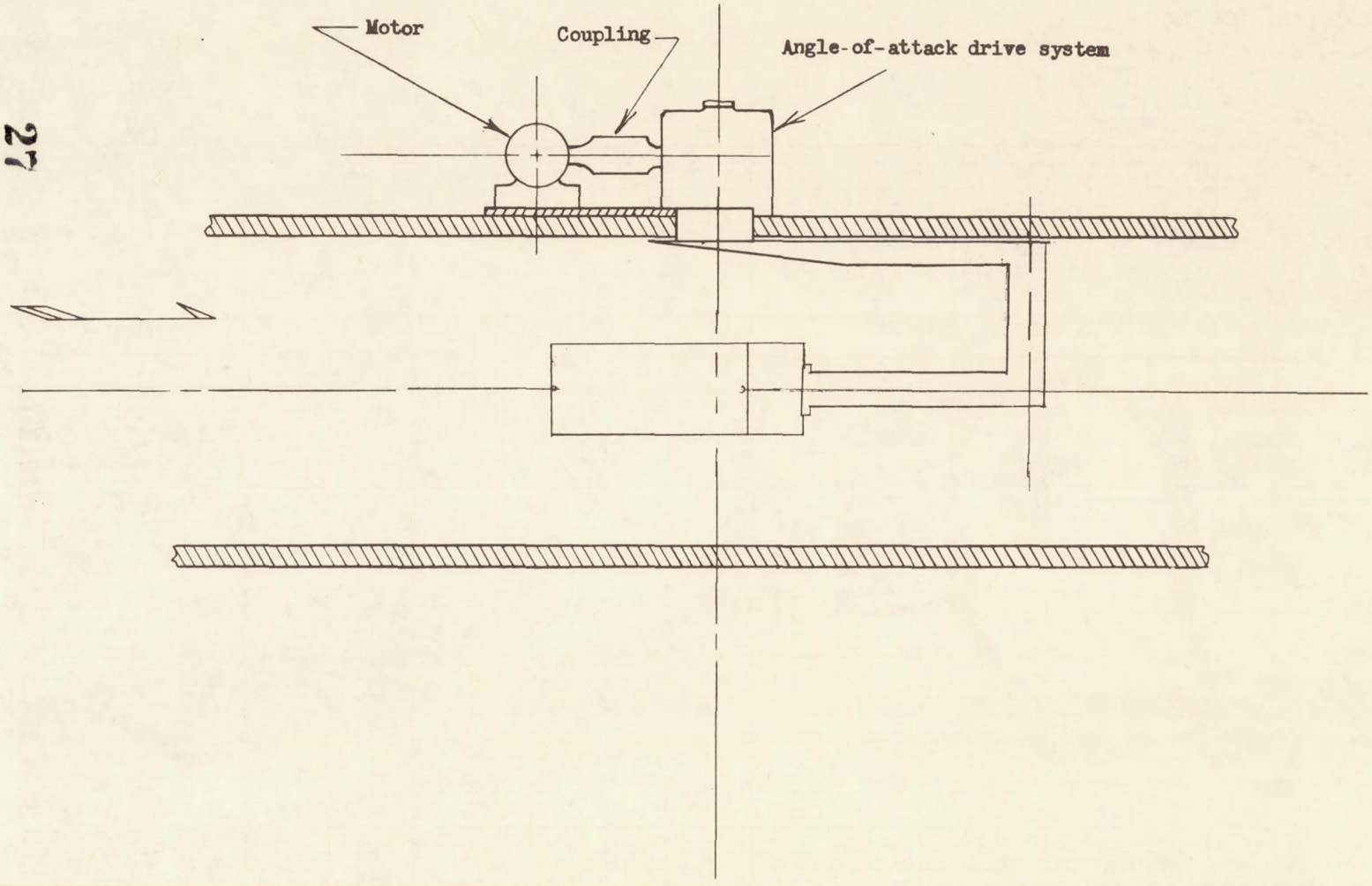


Figure 3.- Schematic diagram of model support system.

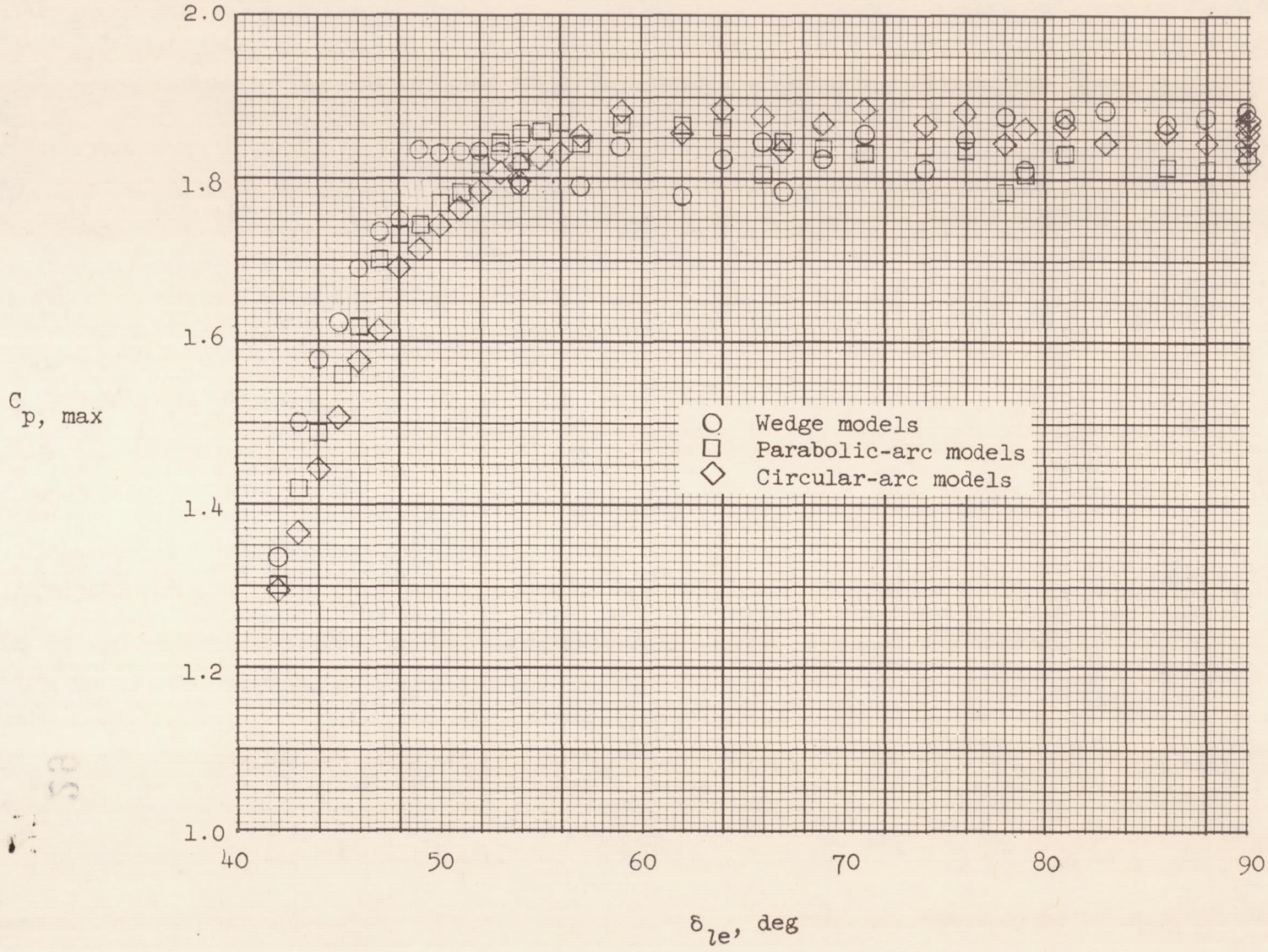


Figure 4.- Maximum pressure coefficients based upon an assumed Mach number of 6.

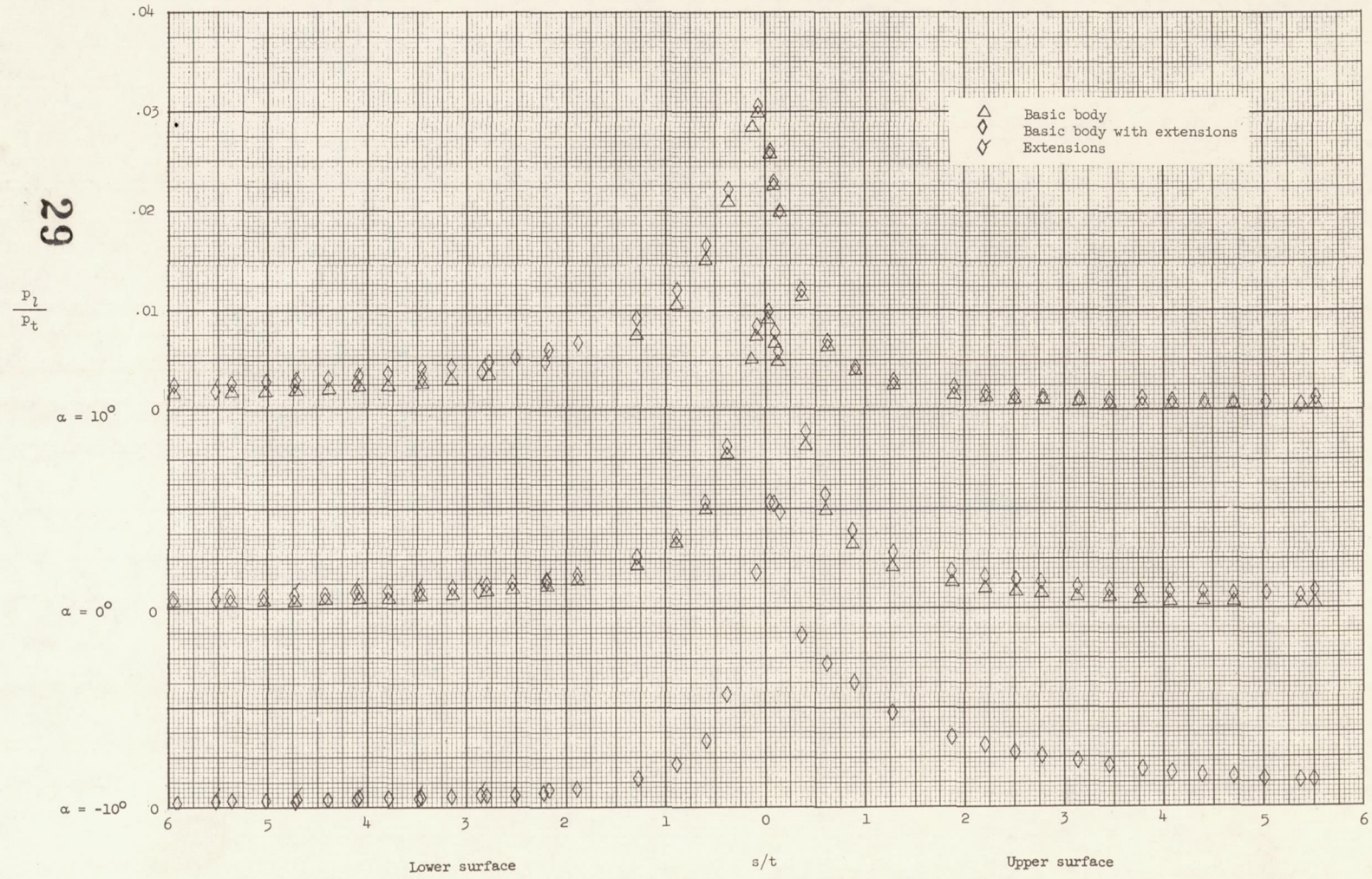
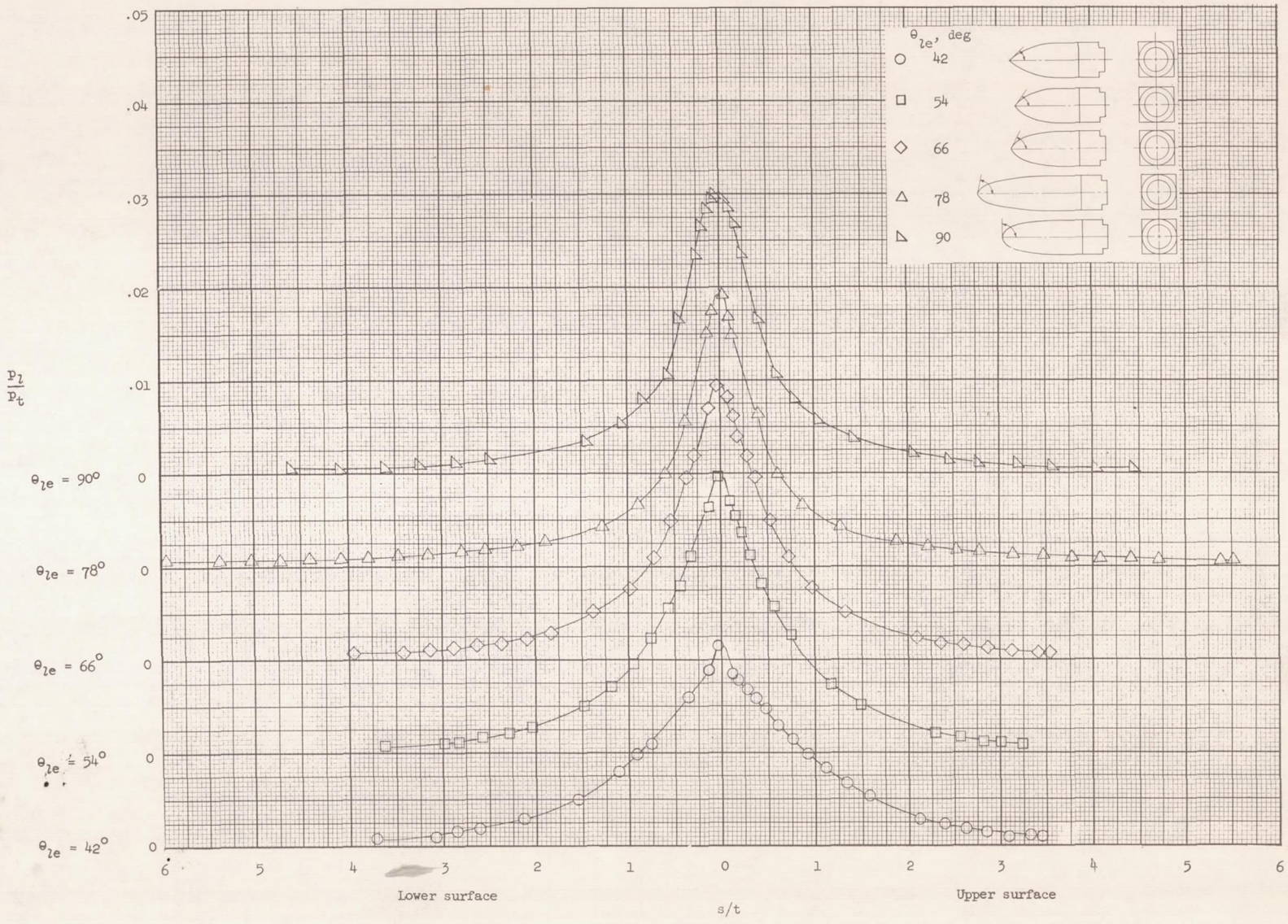
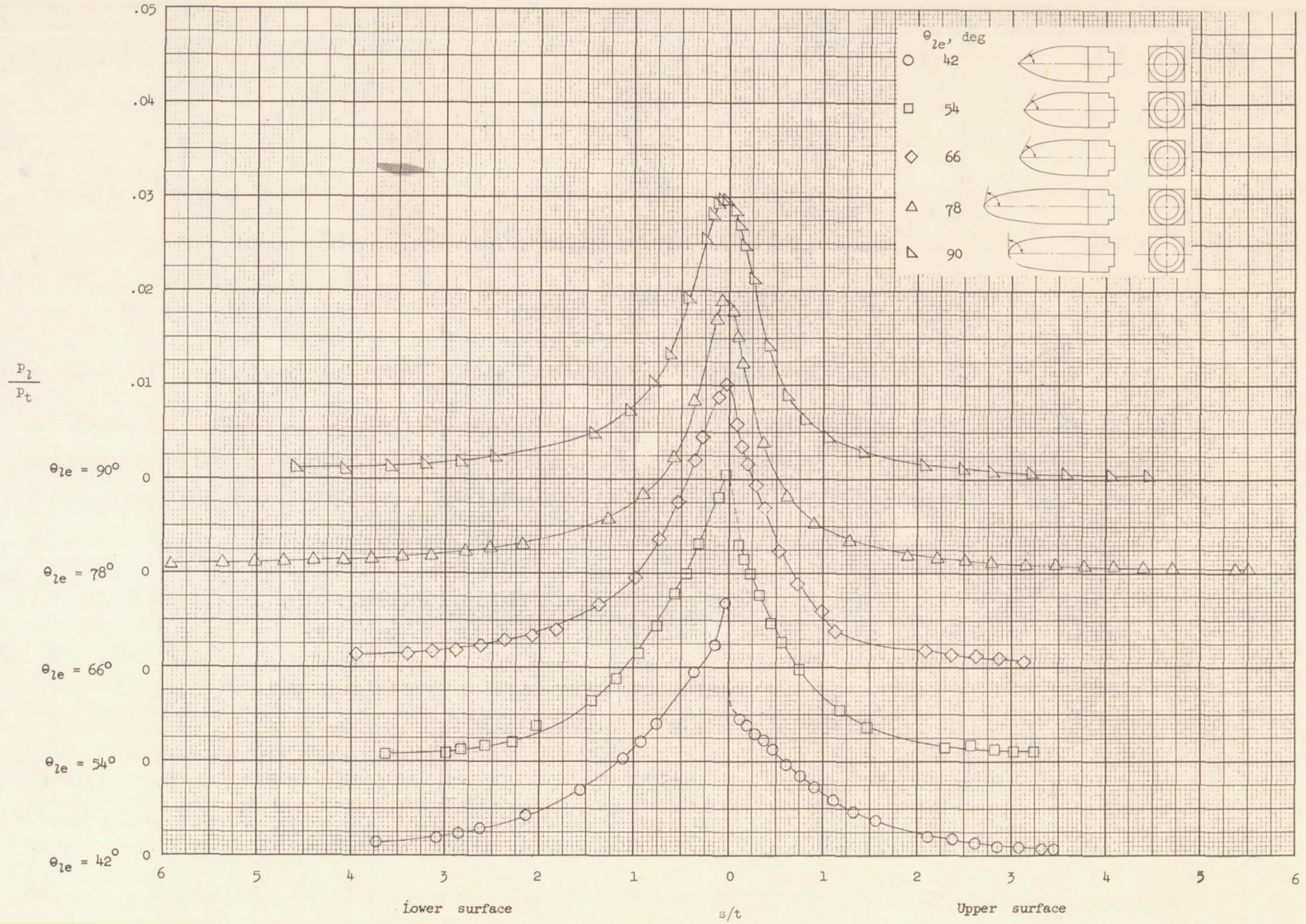


Figure 5.- Pressure distributions of two-dimensional 78° parabola with and without extensions.



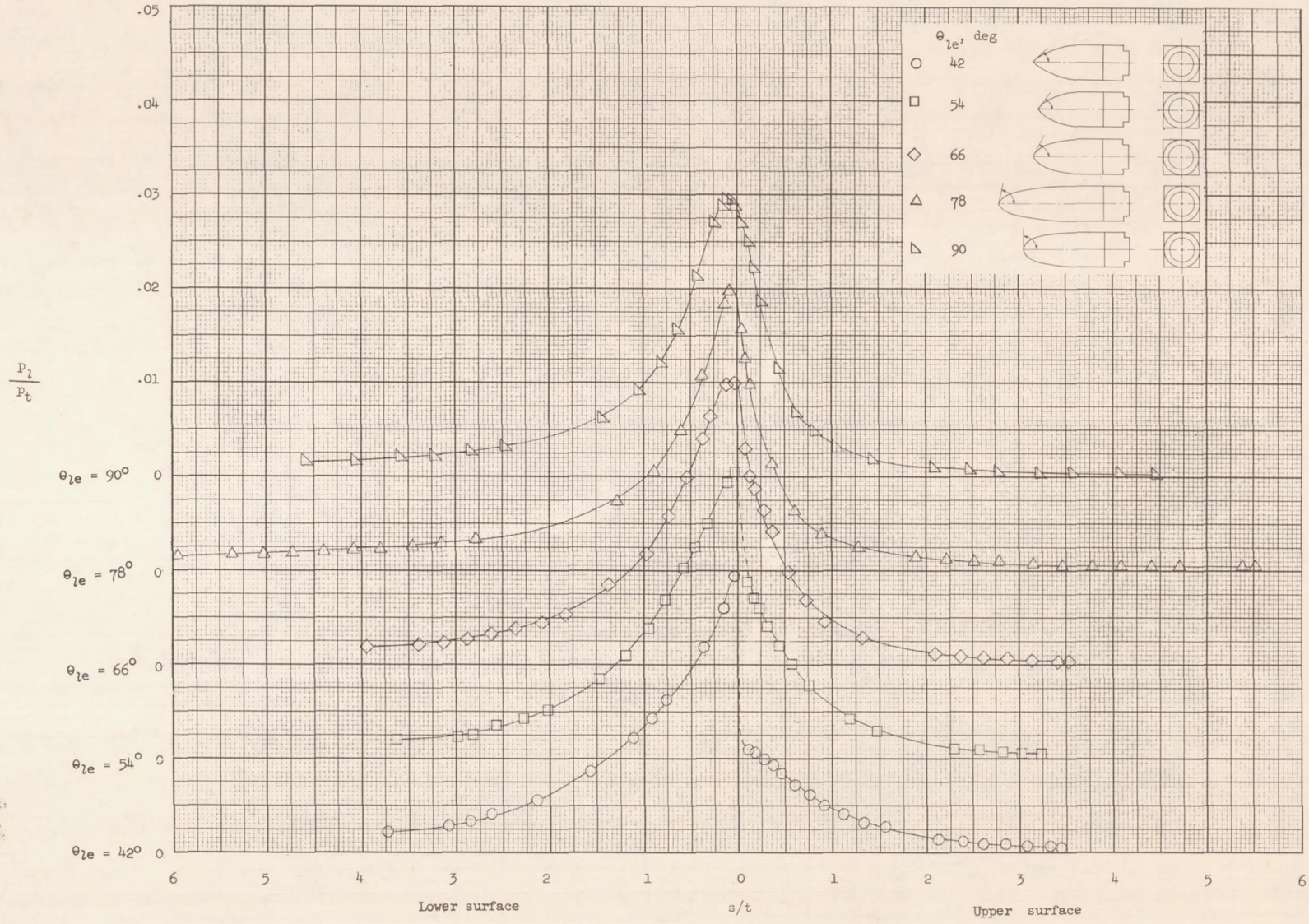
(a) $\alpha = 0°$.

Figure 6.- Pressure distributions of two-dimensional parabolas.



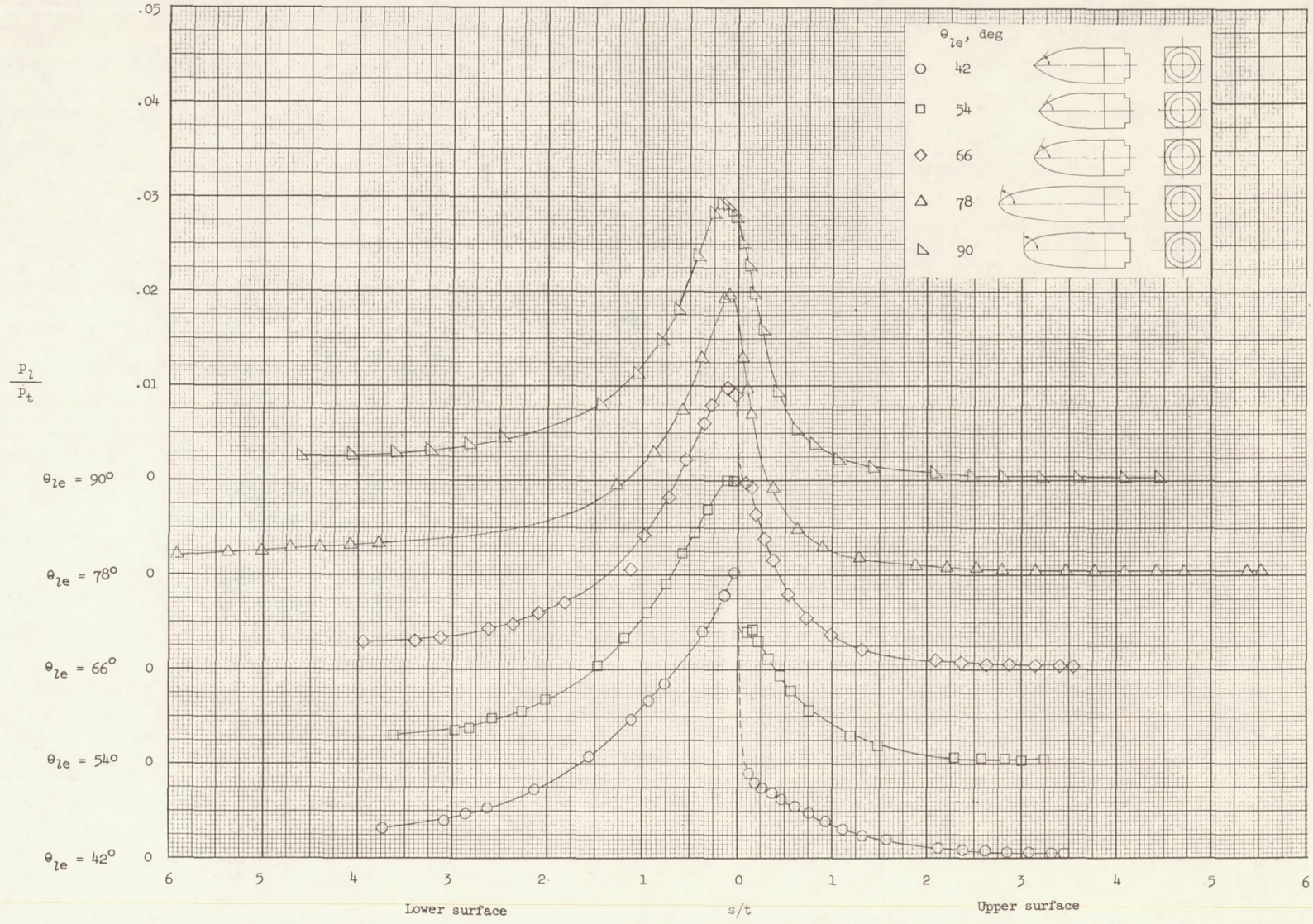
(b) $\alpha = 5°$.

Figure 6.- Continued.



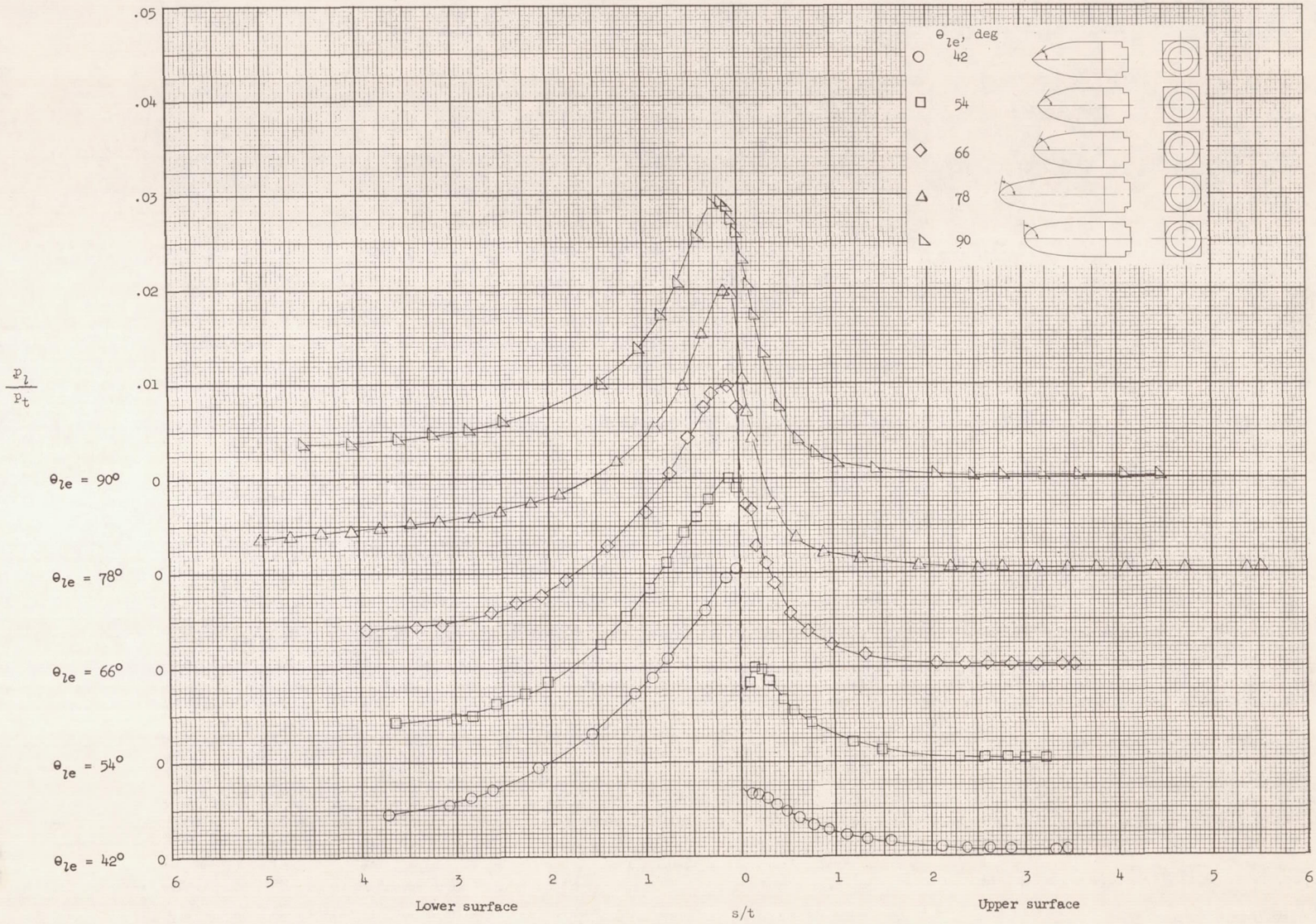
(c) $\alpha = 10°$.

Figure 6.- Continued.



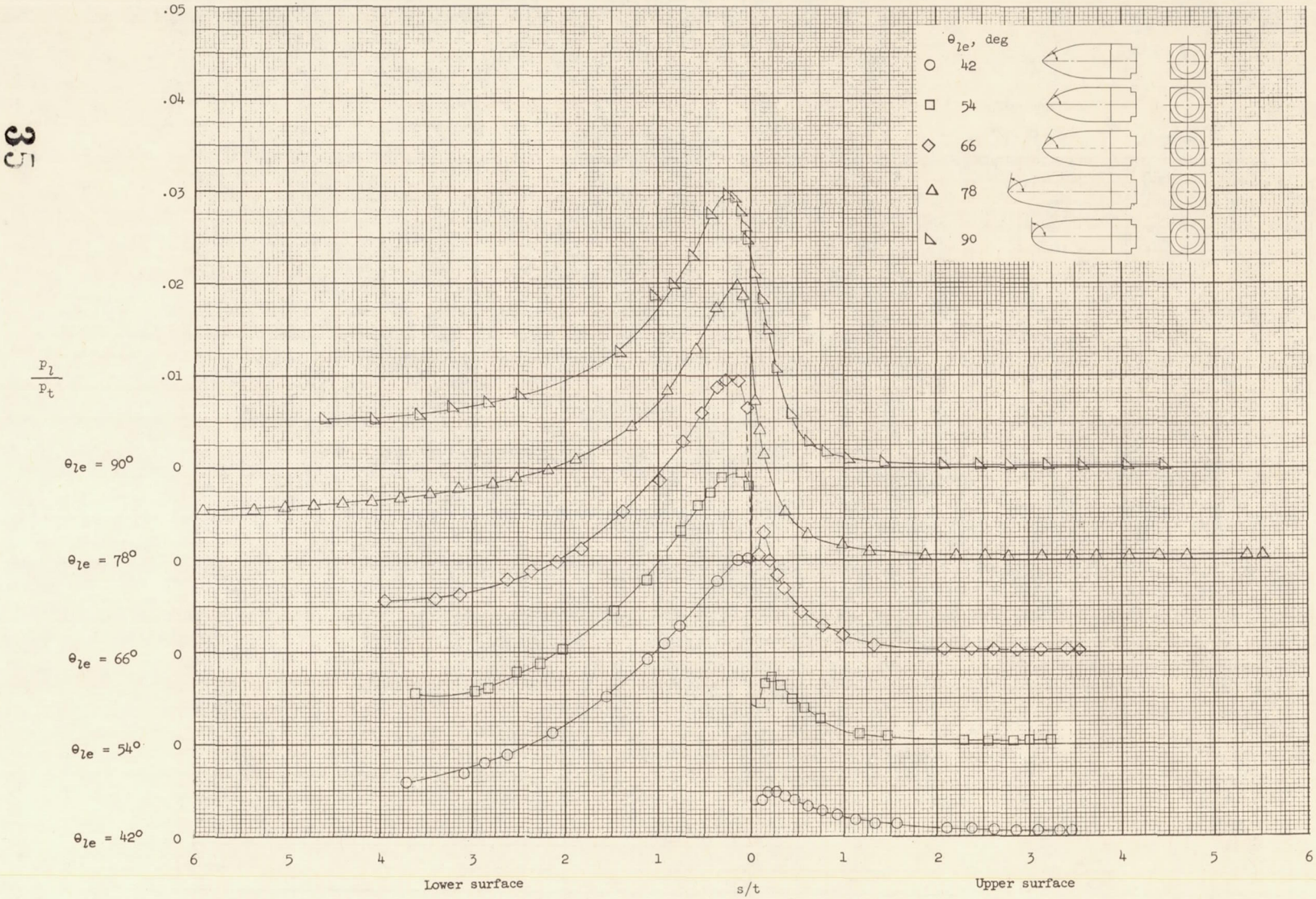
(d) $\alpha = 15°$.

Figure 6.- Continued.



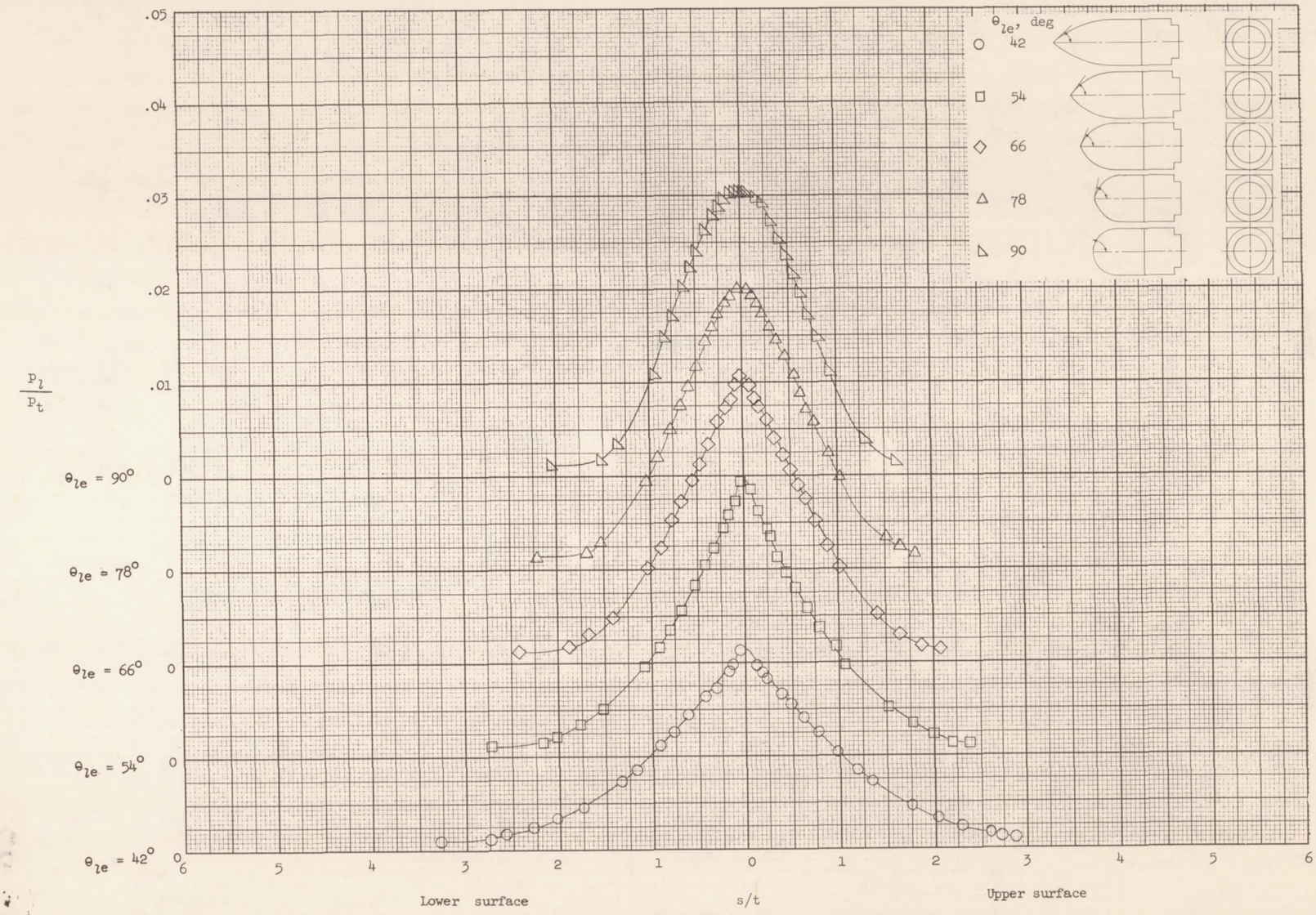
(e) $\alpha = 20^{\circ}$.

Figure 6.- Continued.



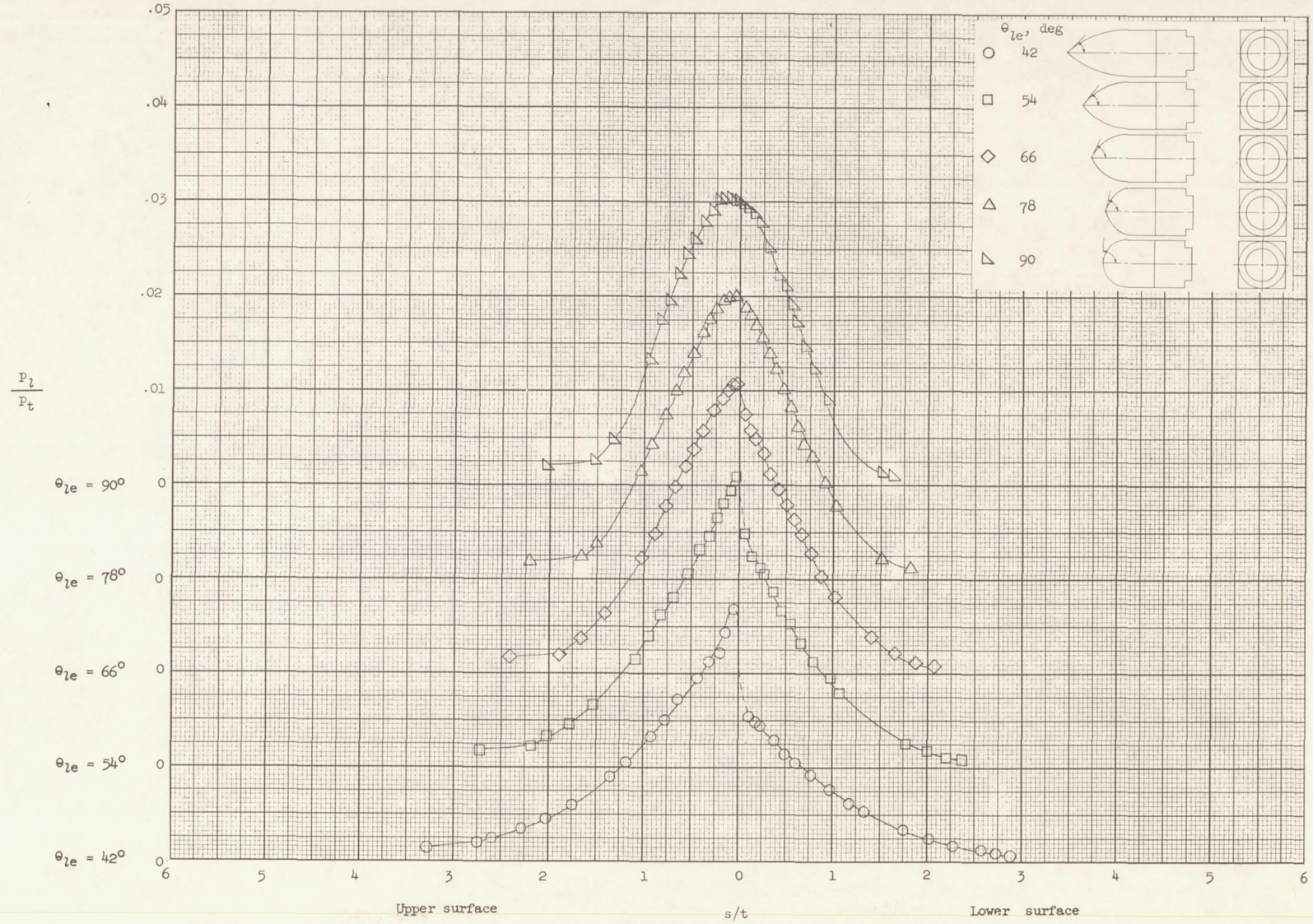
(f) $\alpha = 25°$.

Figure 6.- Concluded.



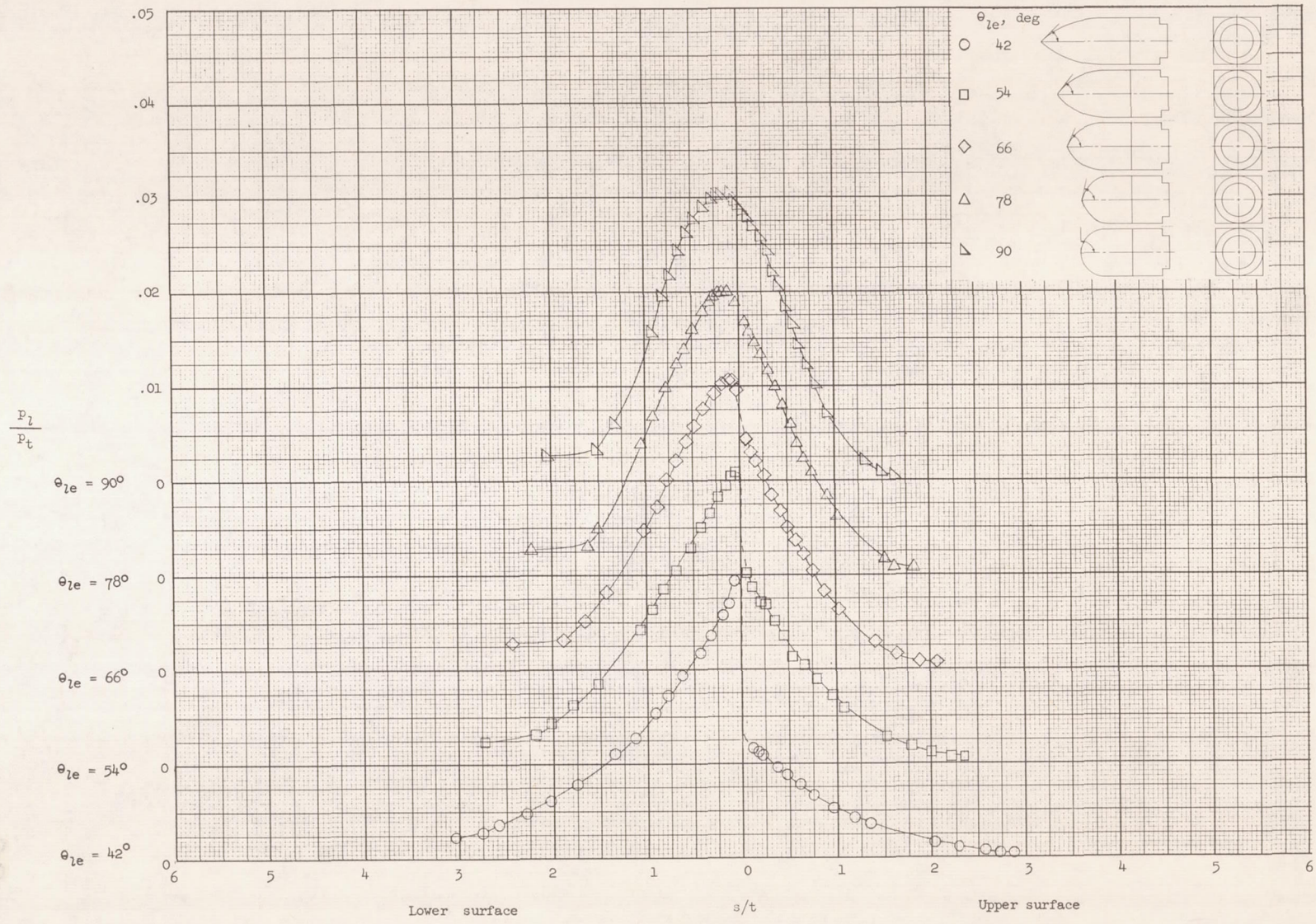
(a) $\alpha = 0°$.

Figure 7.- Pressure distributions of two-dimensional circular arcs.



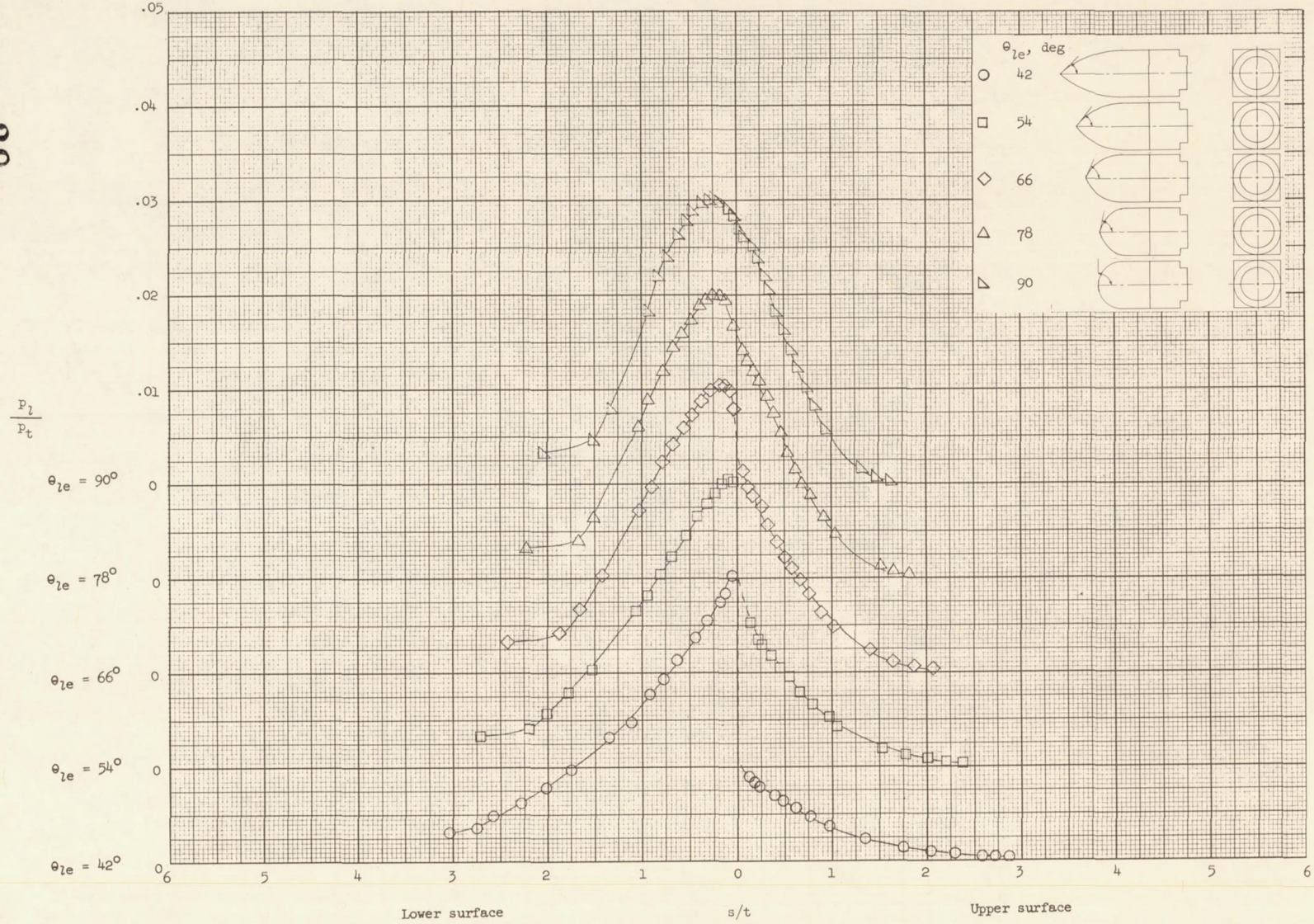
(b) $\alpha = 5^{\circ}$.

Figure 7.- Continued.



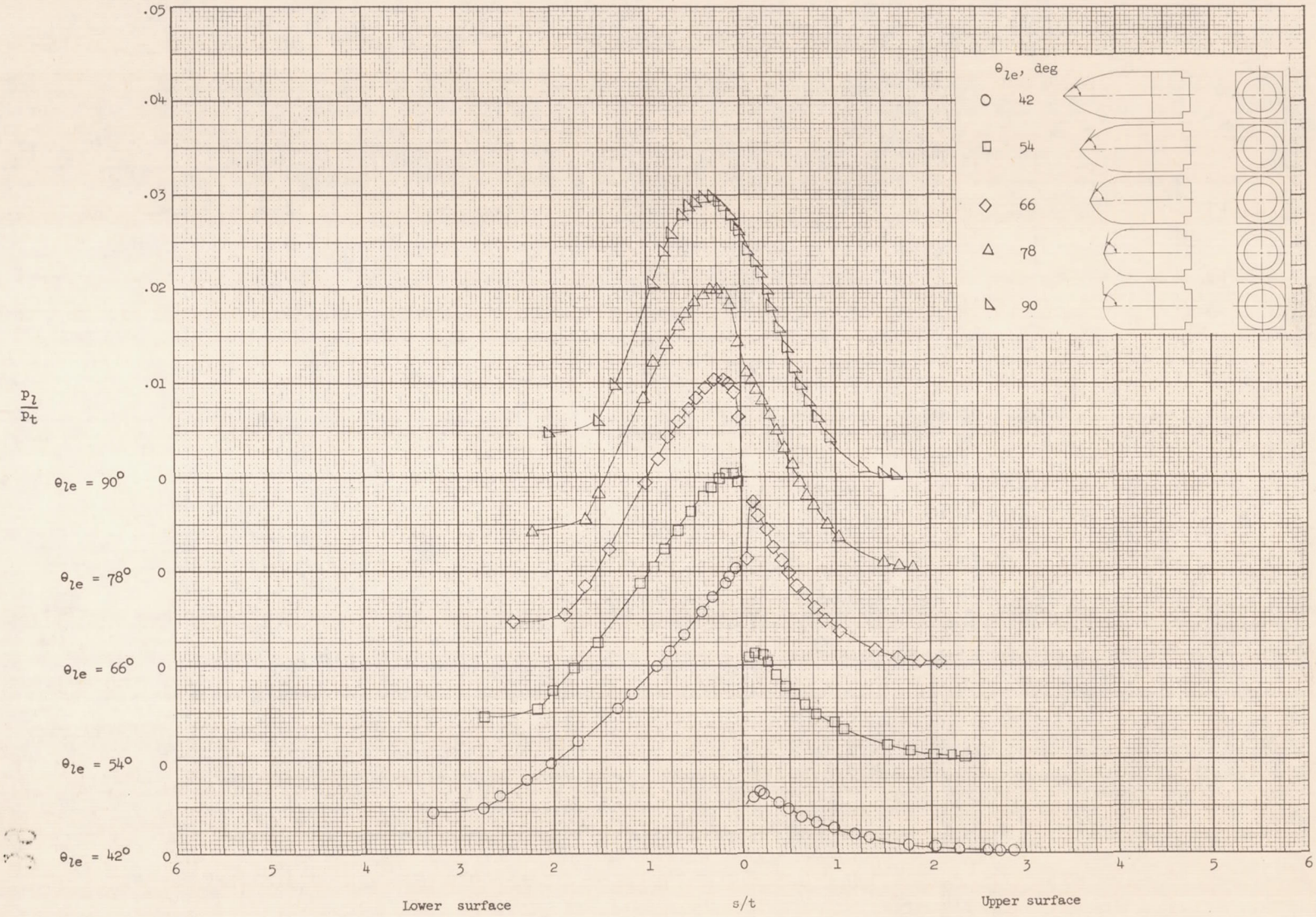
(c) $\alpha = 10^{\circ}$.

Figure 7.- Continued.



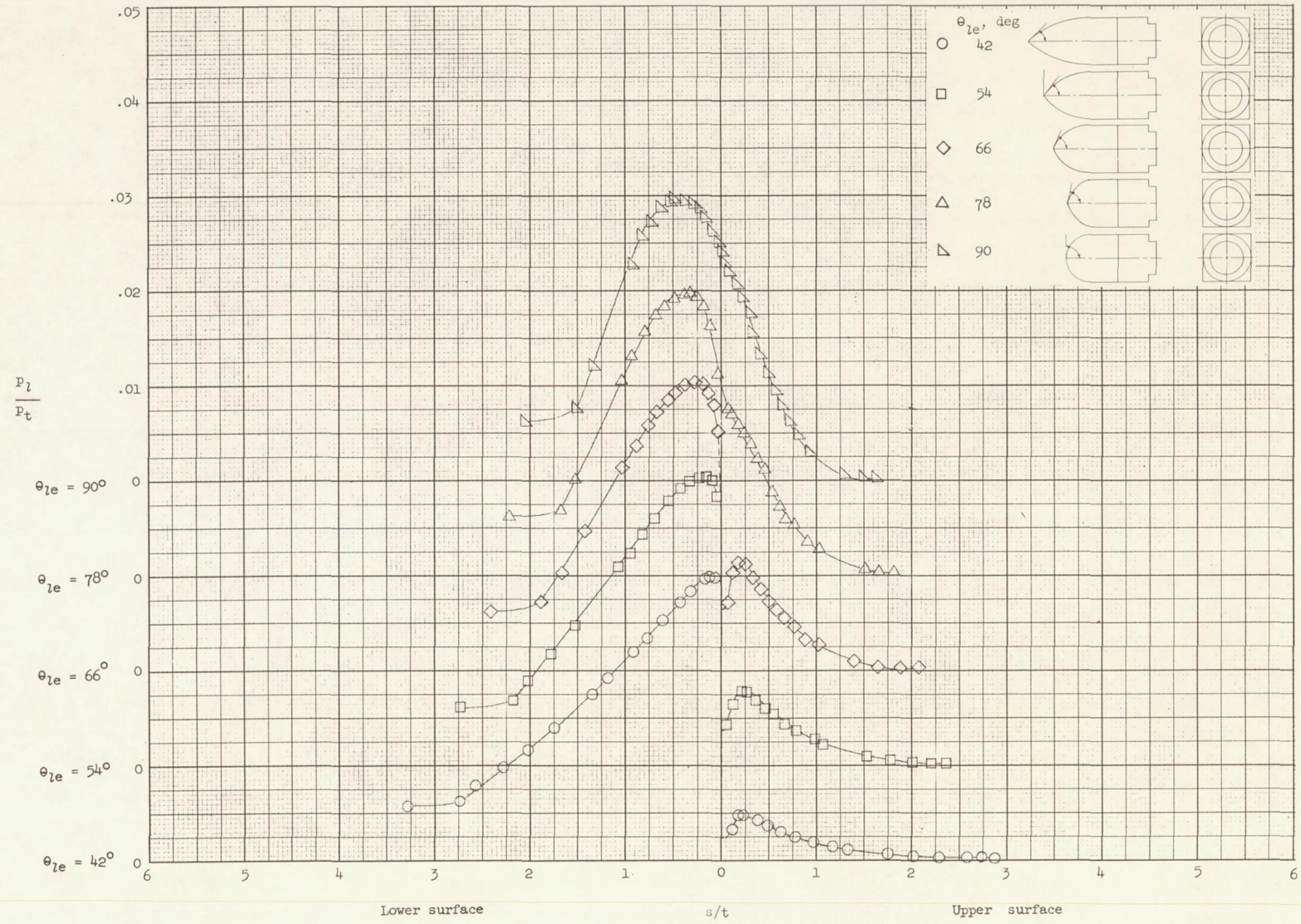
(d) $\alpha = 15^{\circ}$.

Figure 7.- Continued.



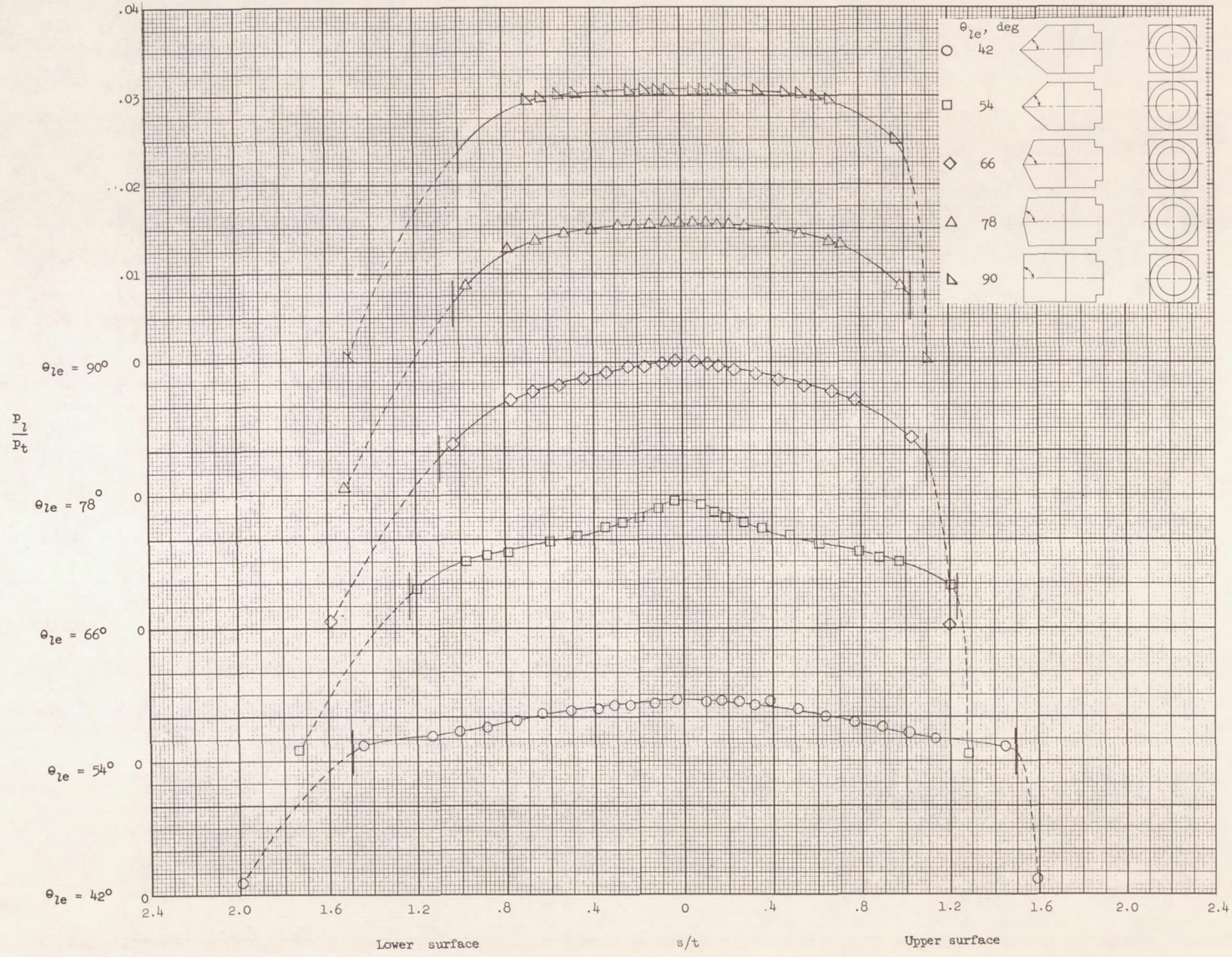
(e) $\alpha = 20^{\circ}$.

Figure 7.- Continued.



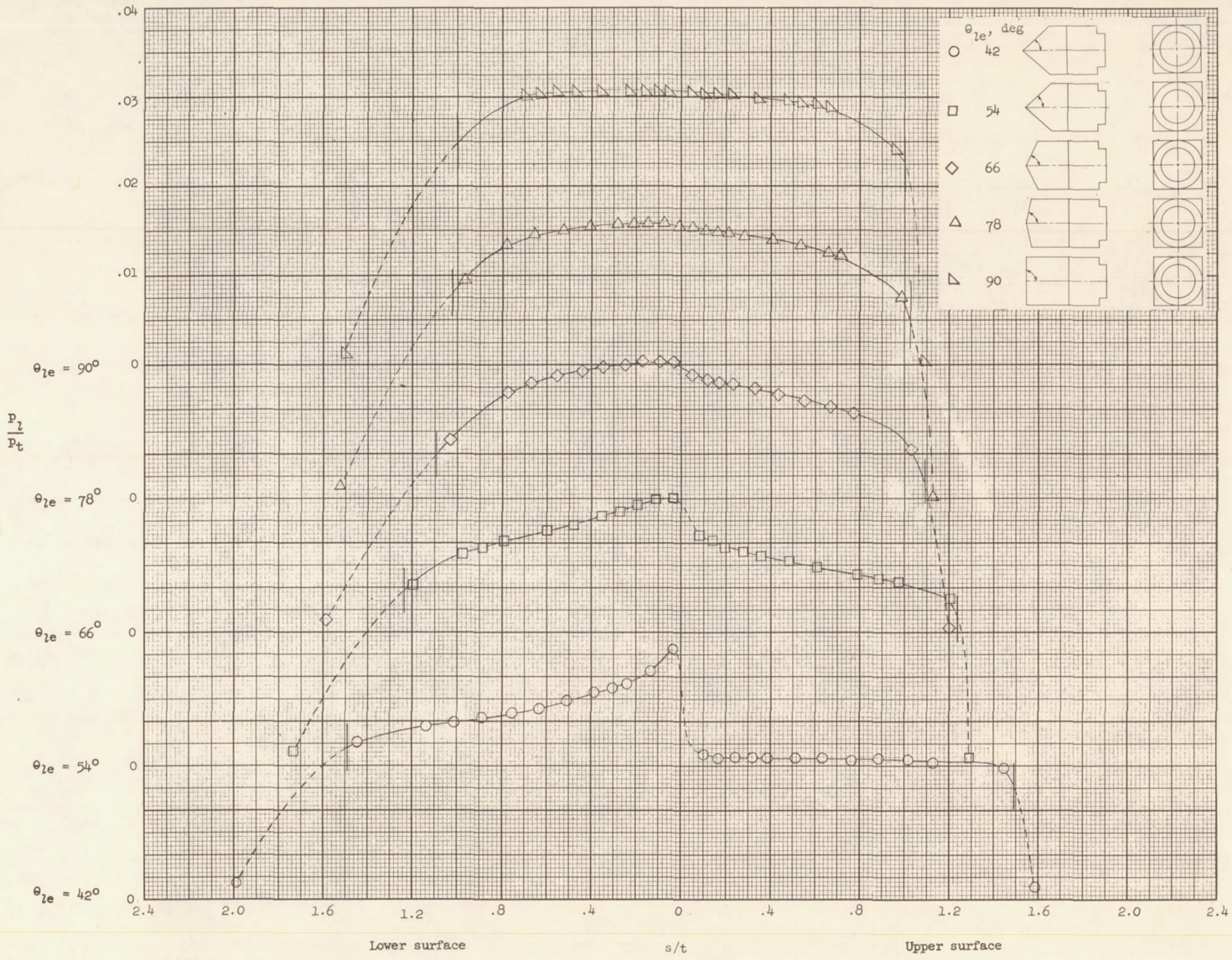
(f) $\alpha = 25°$.

Figure 7.- Concluded.



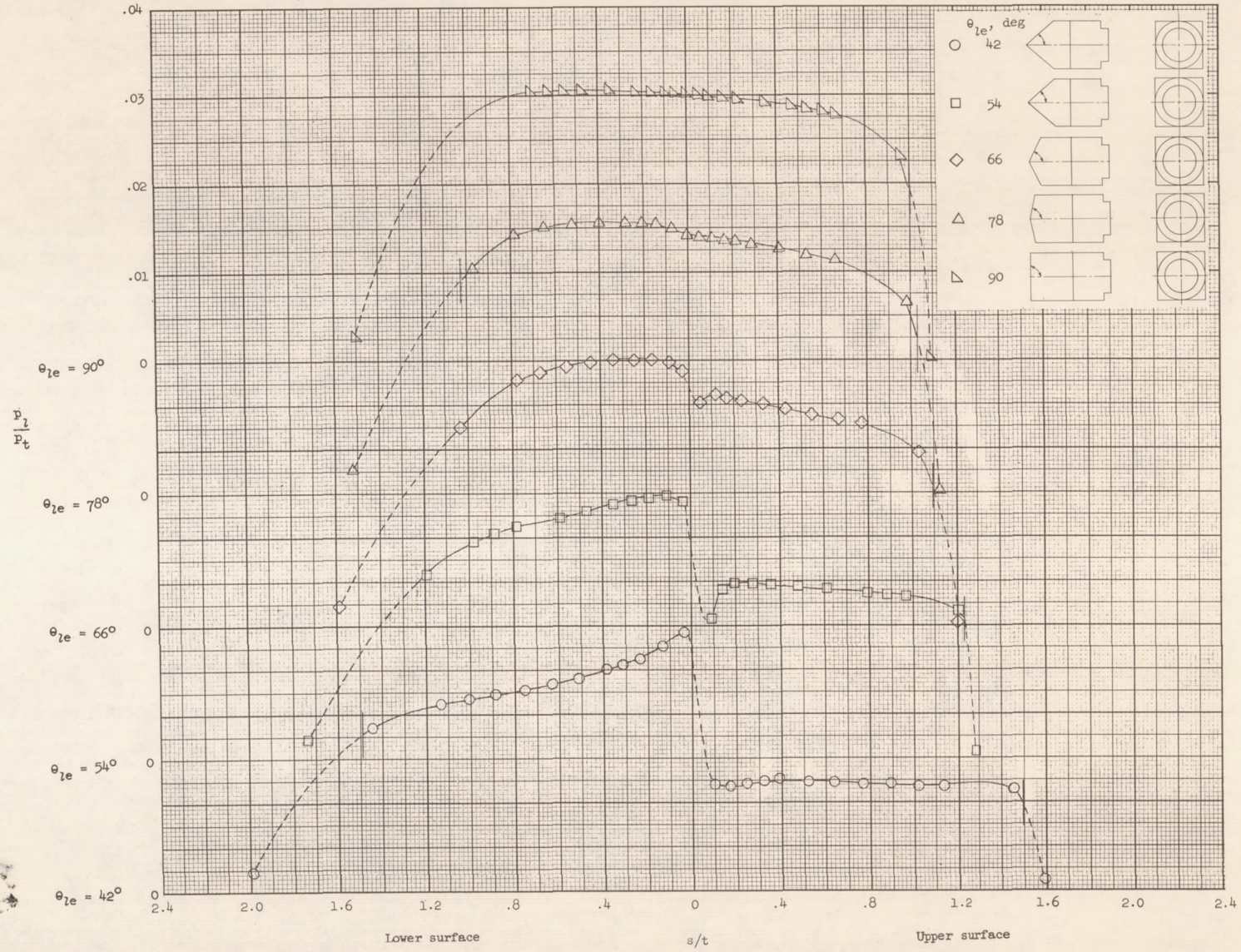
(a) $\alpha = 0^{\circ}$.

Figure 8.- Pressure distributions of wedges.



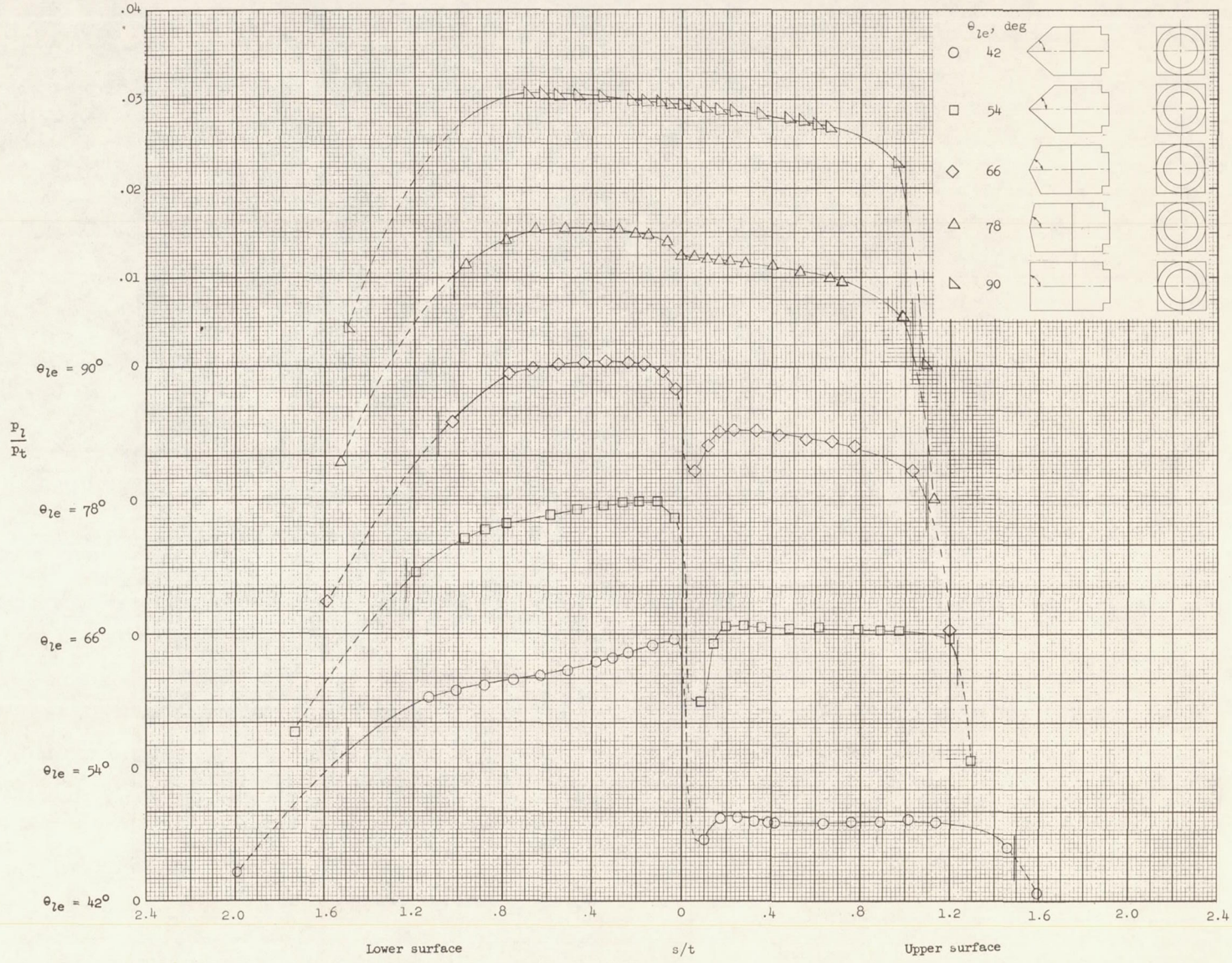
(b) $\alpha = 5°$.

Figure 8.- Continued.



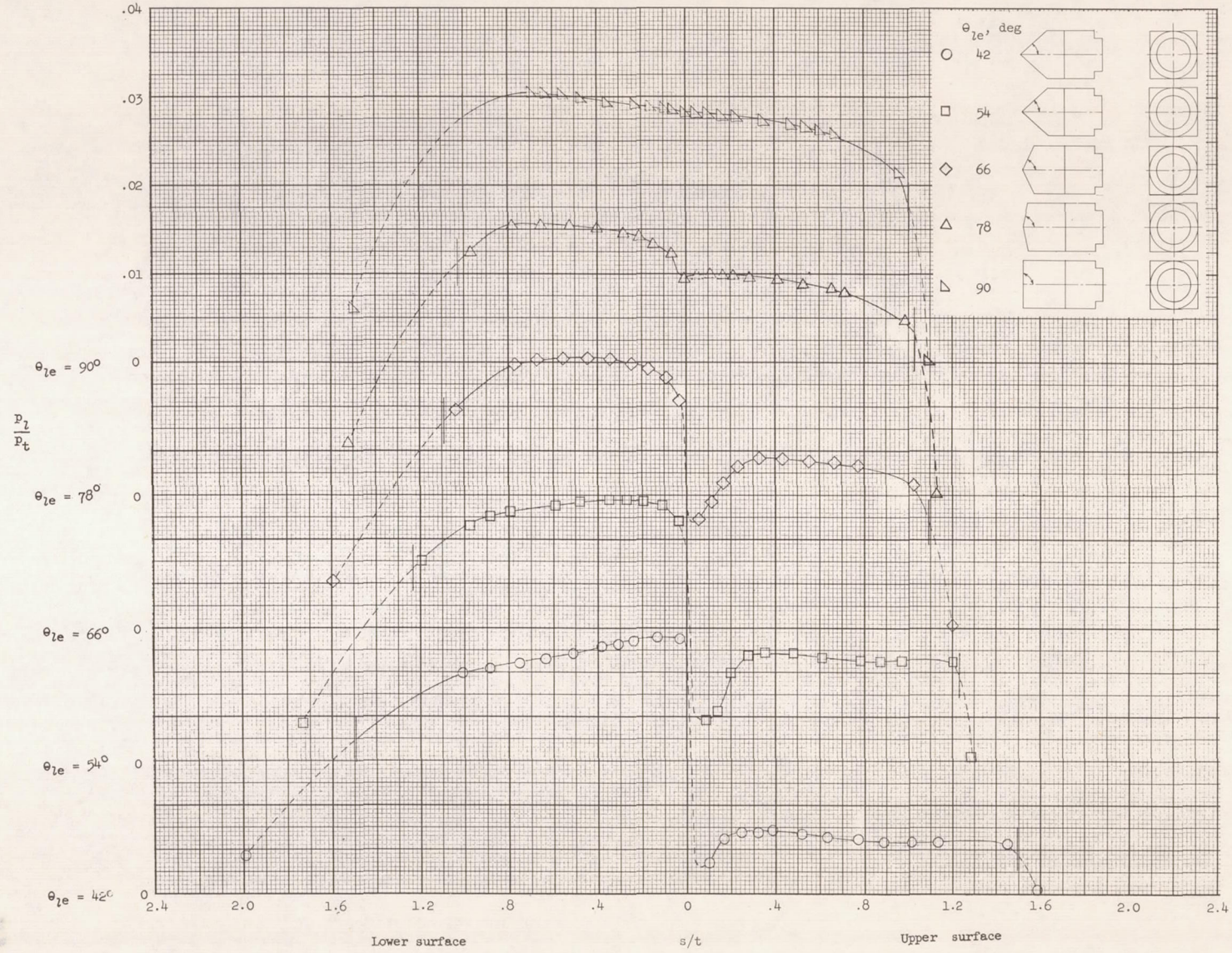
(c) $\alpha = 10^{\circ}$.

Figure 8.- Continued.



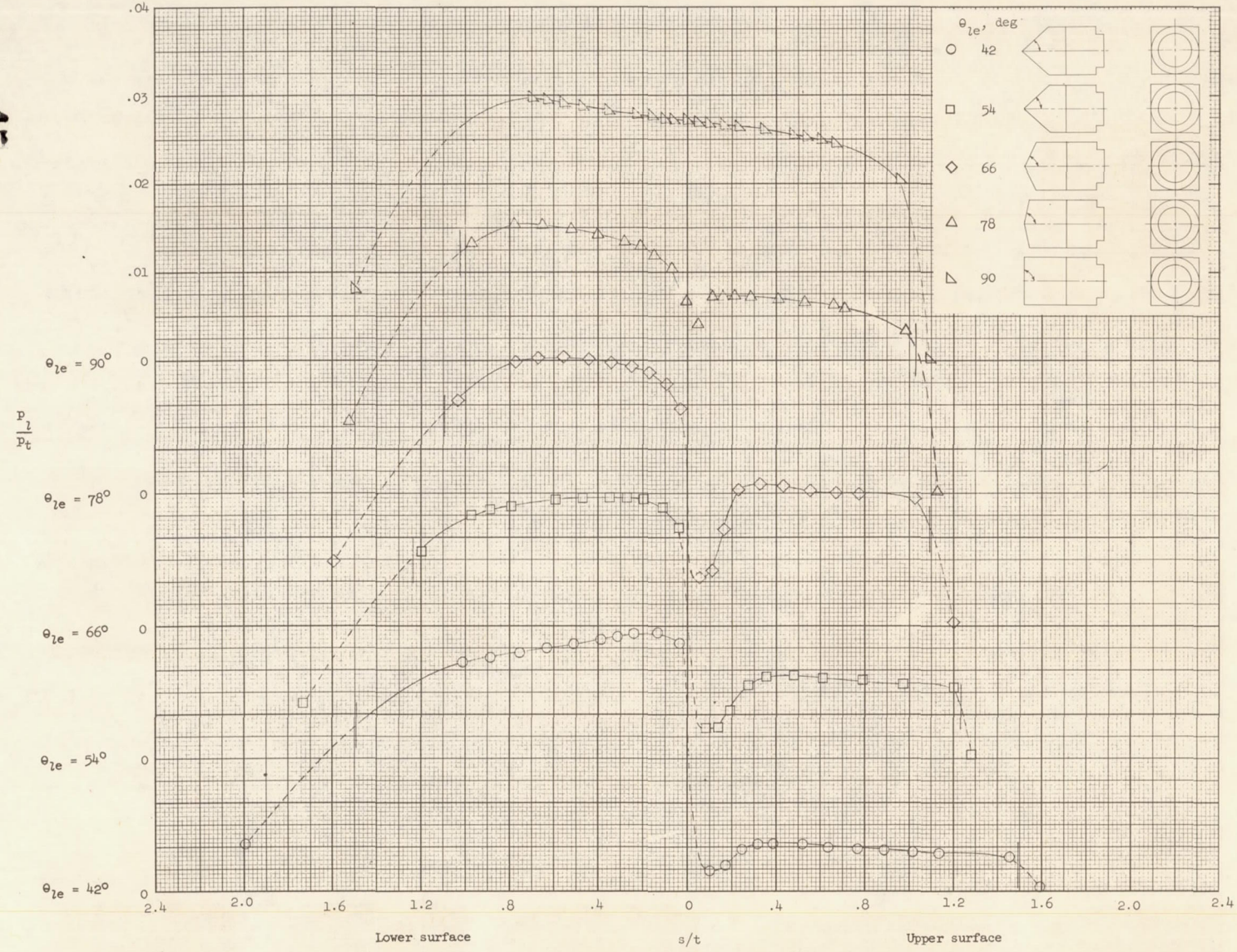
(d) $\alpha = 15^{\circ}$.

Figure 8.- Continued.



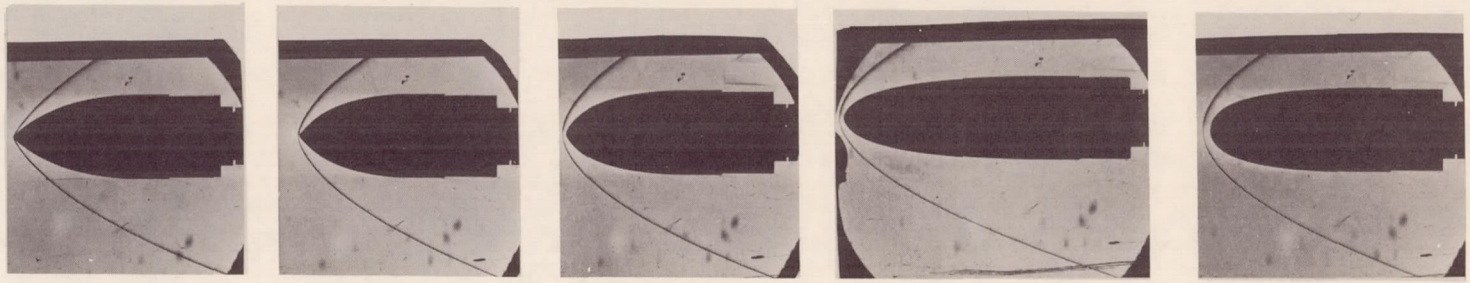
(e) $\alpha = 20^{\circ}$.

Figure 8.- Continued.



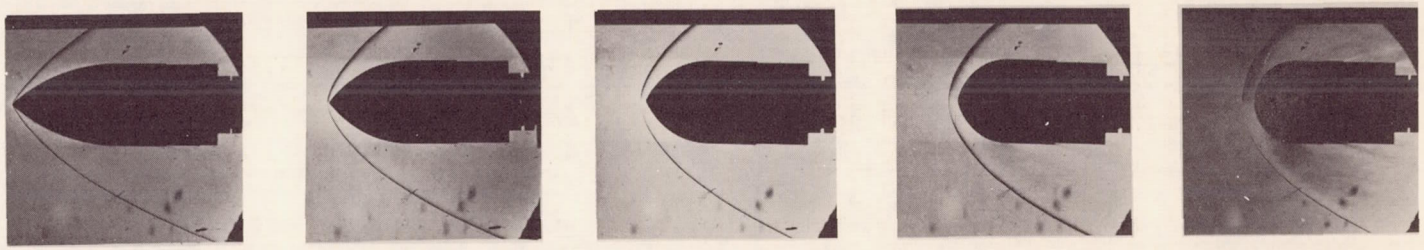
(f) $\alpha = 25°$.

Figure 8.- Concluded.



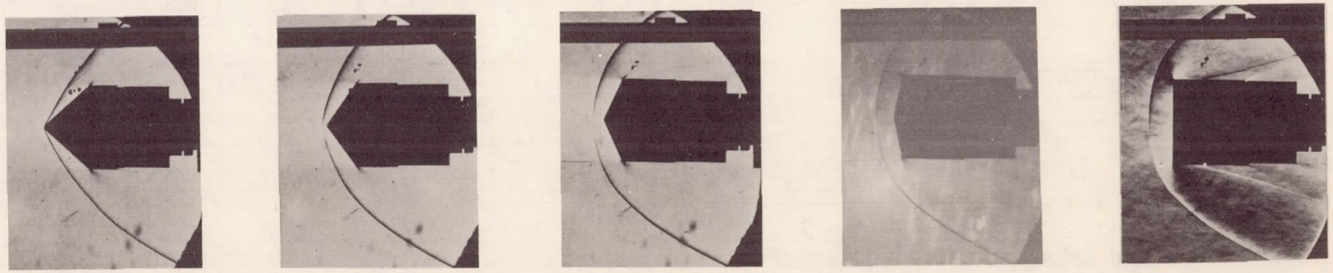
$\theta_{le} = 42^{\circ}$ $\theta_{le} = 54^{\circ}$ $\theta_{le} = 66^{\circ}$ $\theta_{le} = 78^{\circ}$ $\theta_{le} = 90^{\circ}$

(a) Parabolic arc models.



$\theta_{le} = 42^{\circ}$ $\theta_{le} = 54^{\circ}$ $\theta_{le} = 66^{\circ}$ $\theta_{le} = 78^{\circ}$ $\theta_{le} = 90^{\circ}$

(b) Circular arc models.



$\theta_{le} = 42^{\circ}$ $\theta_{le} = 54^{\circ}$ $\theta_{le} = 66^{\circ}$ $\theta_{le} = 78^{\circ}$ $\theta_{le} = 90^{\circ}$

(c) Wedge models.

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Figure 9.- Schlieren photographs of aerodynamically blunt bodies near 0° angle of attack.

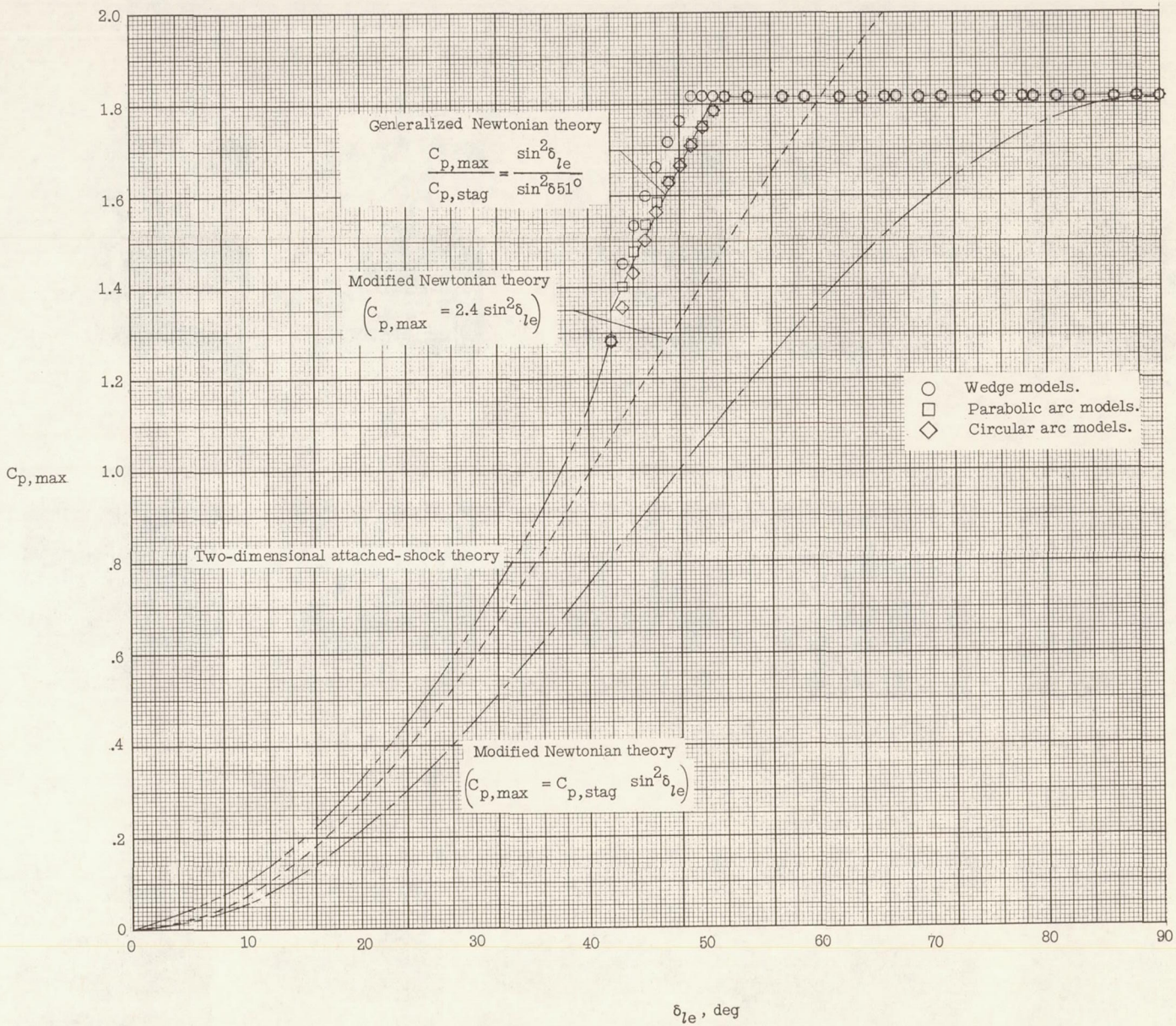


Figure 10.- Comparison of measured and predicted pressure coefficients on the lower surface for aerodynamically blunt bodies.

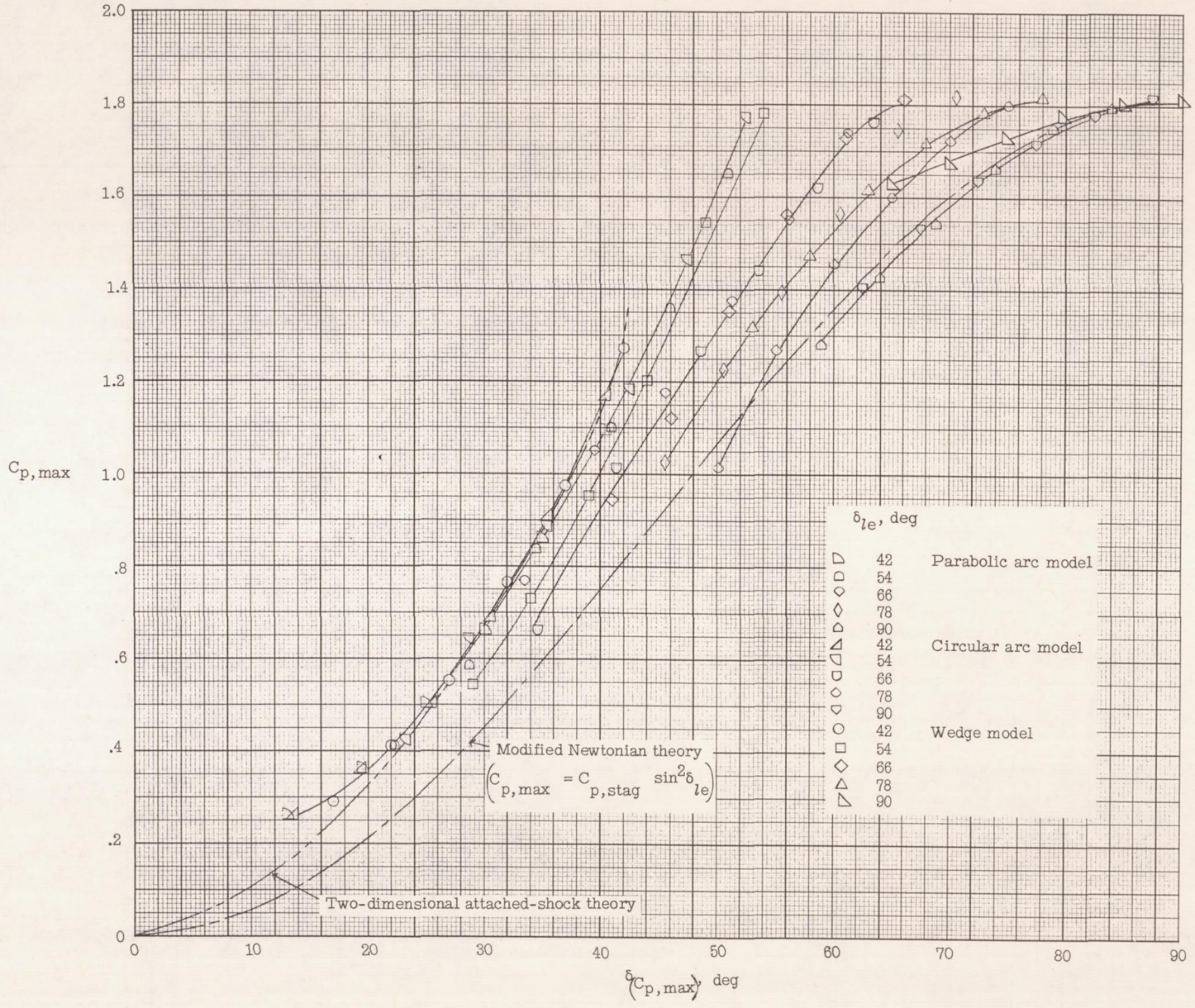
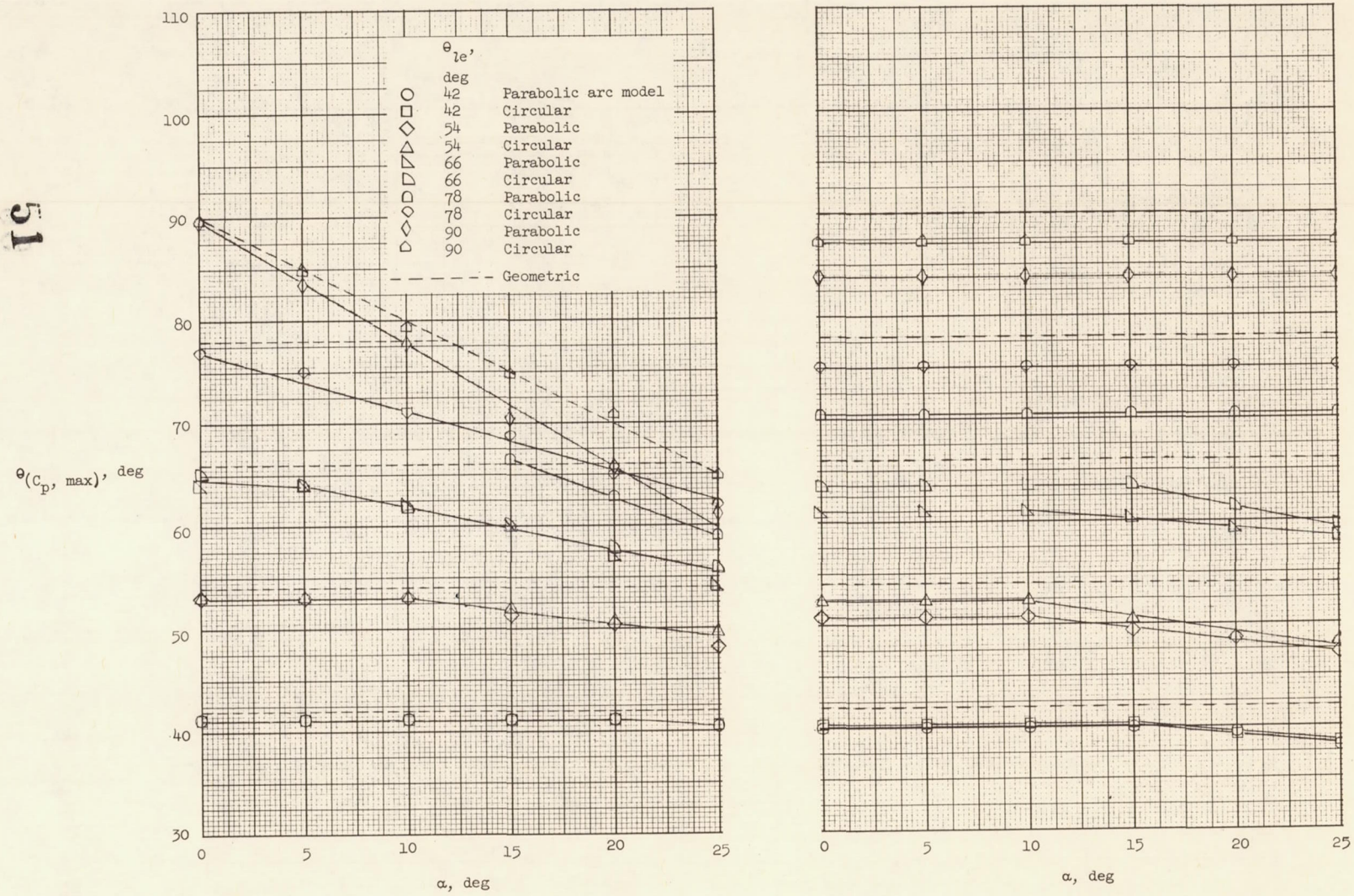


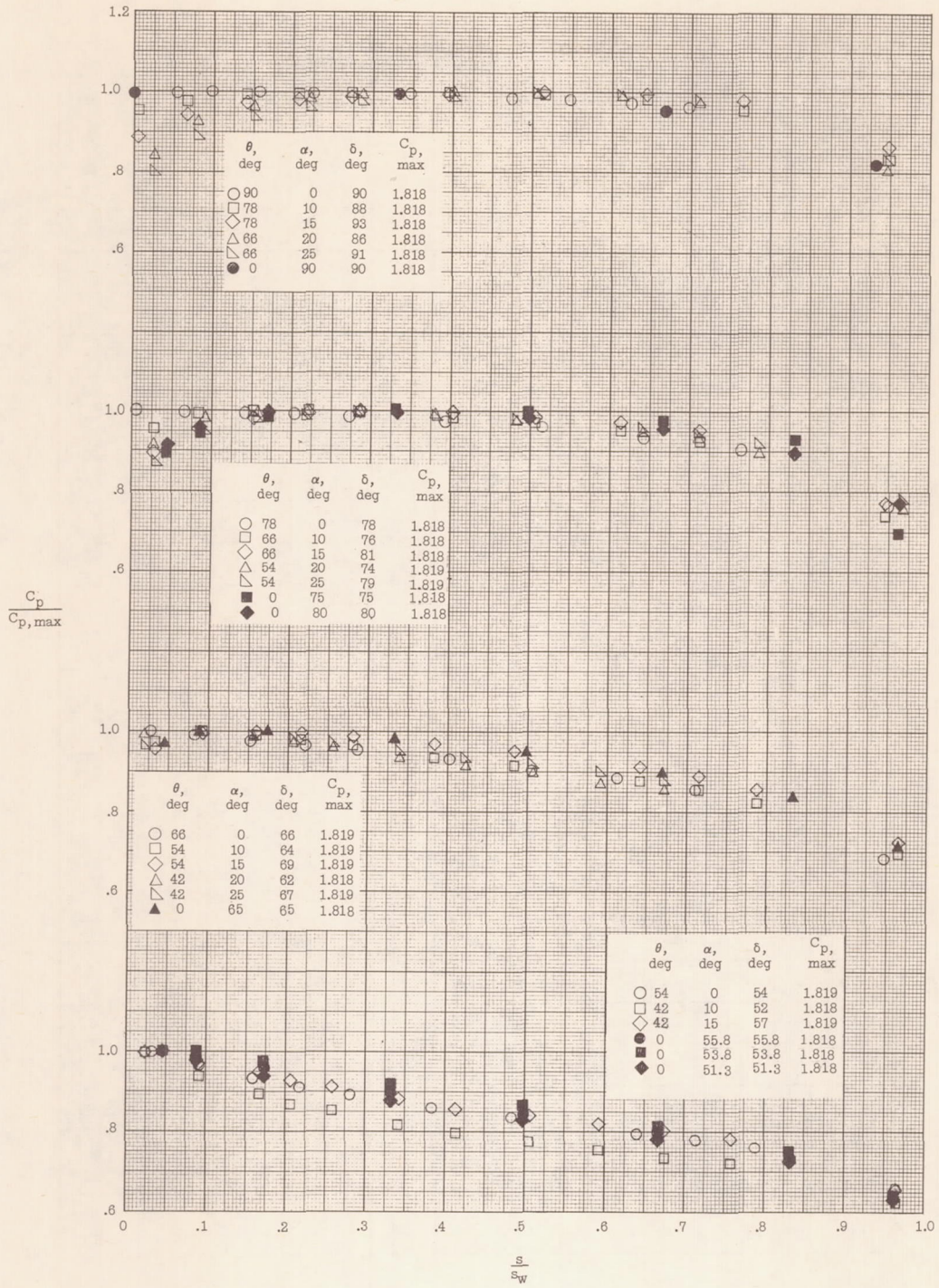
Figure 11.- Comparison of measured and predicted maximum pressure coefficients on the upper surface for aerodynamically blunt bodies.



(a) Lower surface

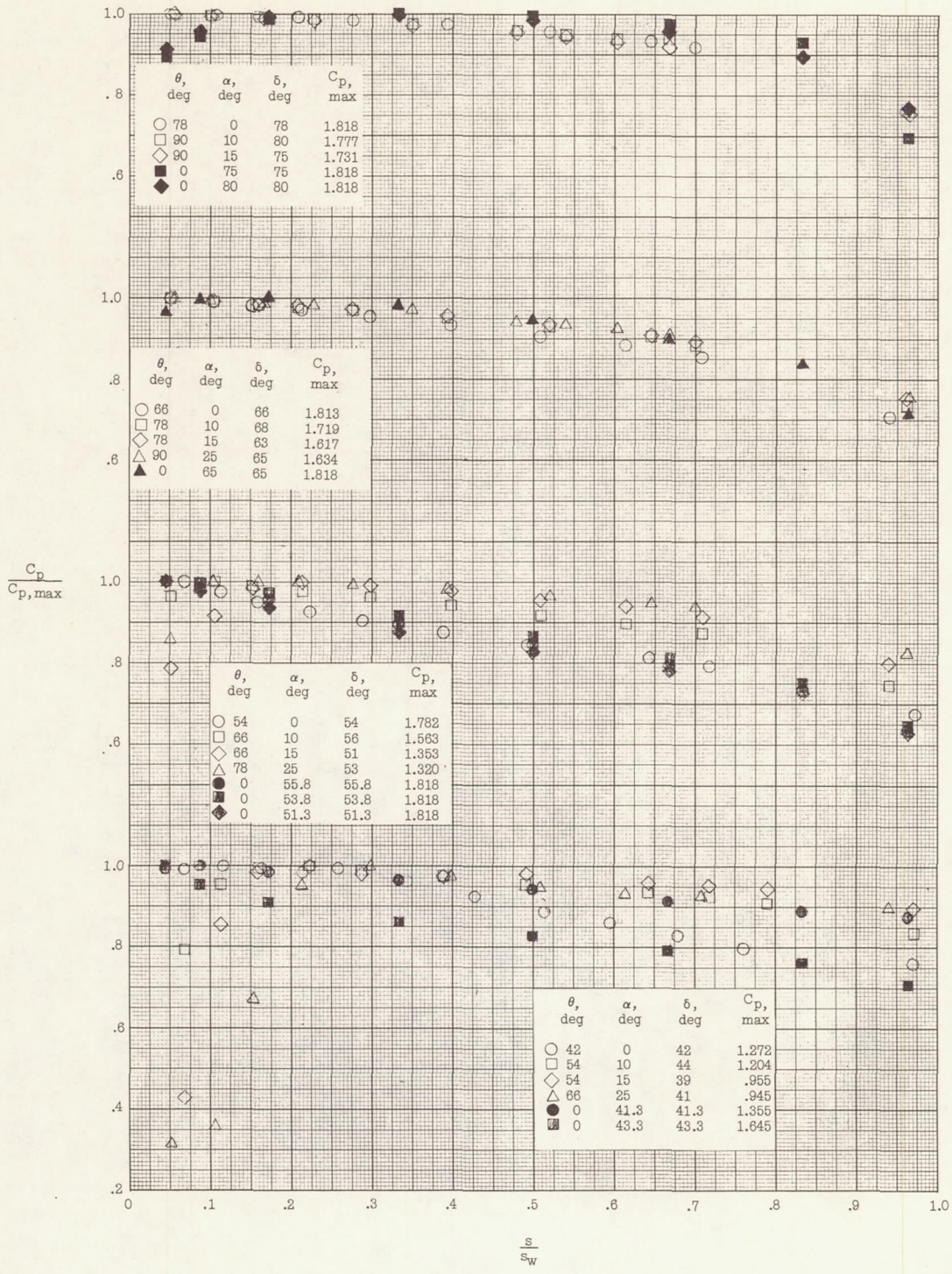
(b) Upper surface

Figure 12.- Comparison of geometric and measured slopes at which maximum pressure occurred for various angles of attack on the parabolic and circular arc bodies.



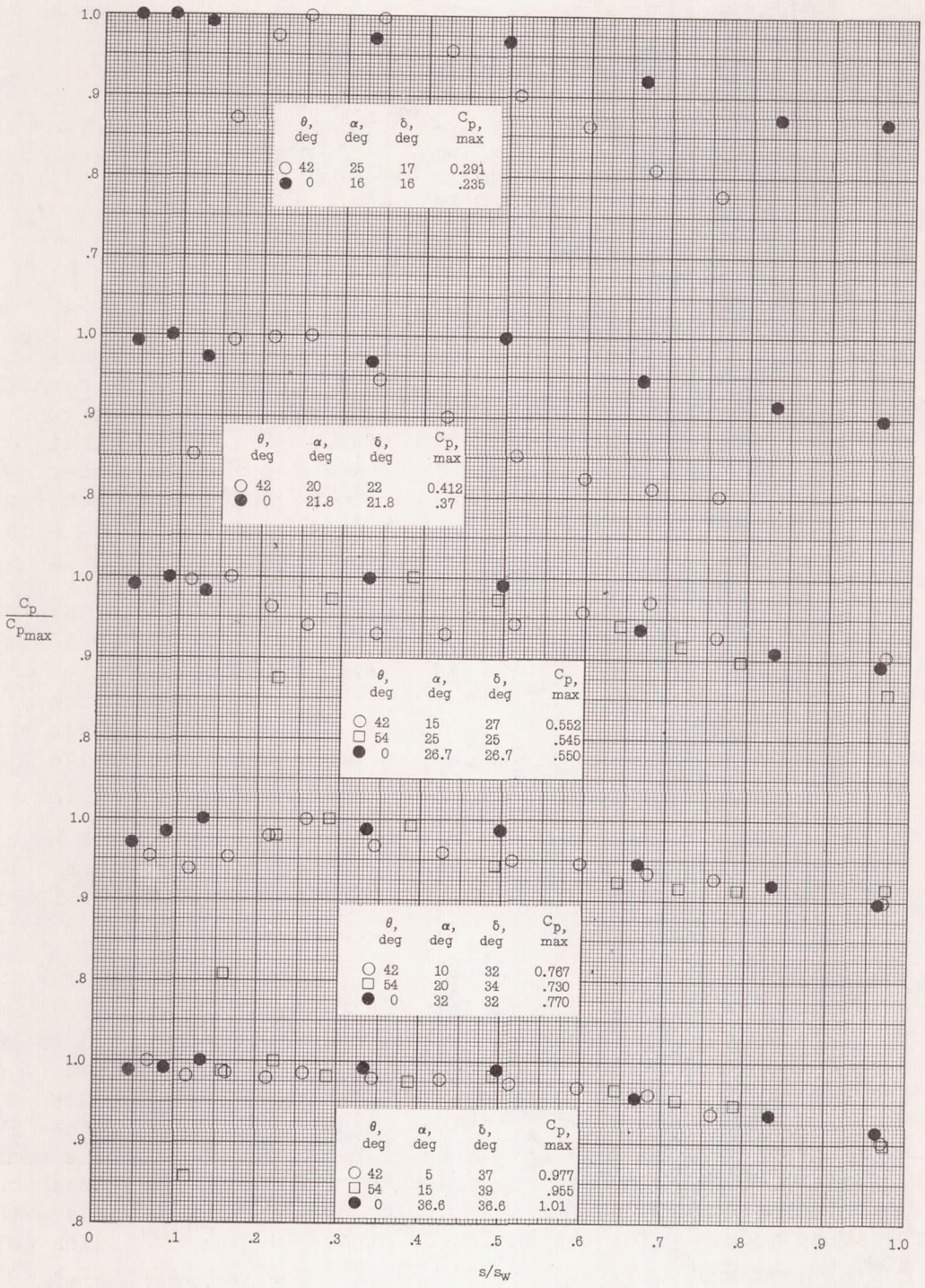
(a) Lower surface.

Figure 13.- Comparison of pressure distributions on wedges with constant deflection angles. Solid symbols are for flat-plate data at approximately the same deflection angles (ref. 2).



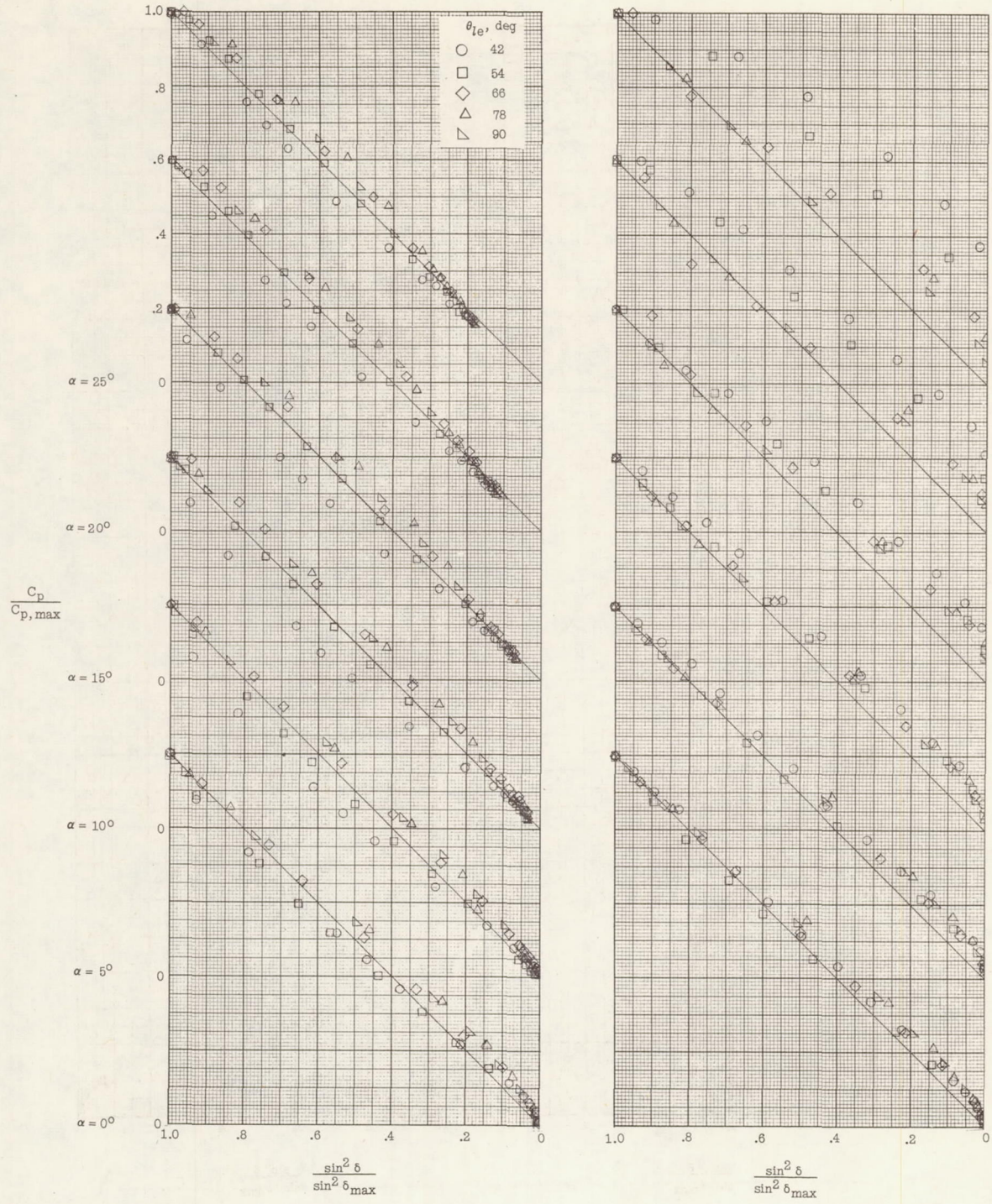
(b) Upper surface.

Figure 13.- Continued.



(b) Concluded.

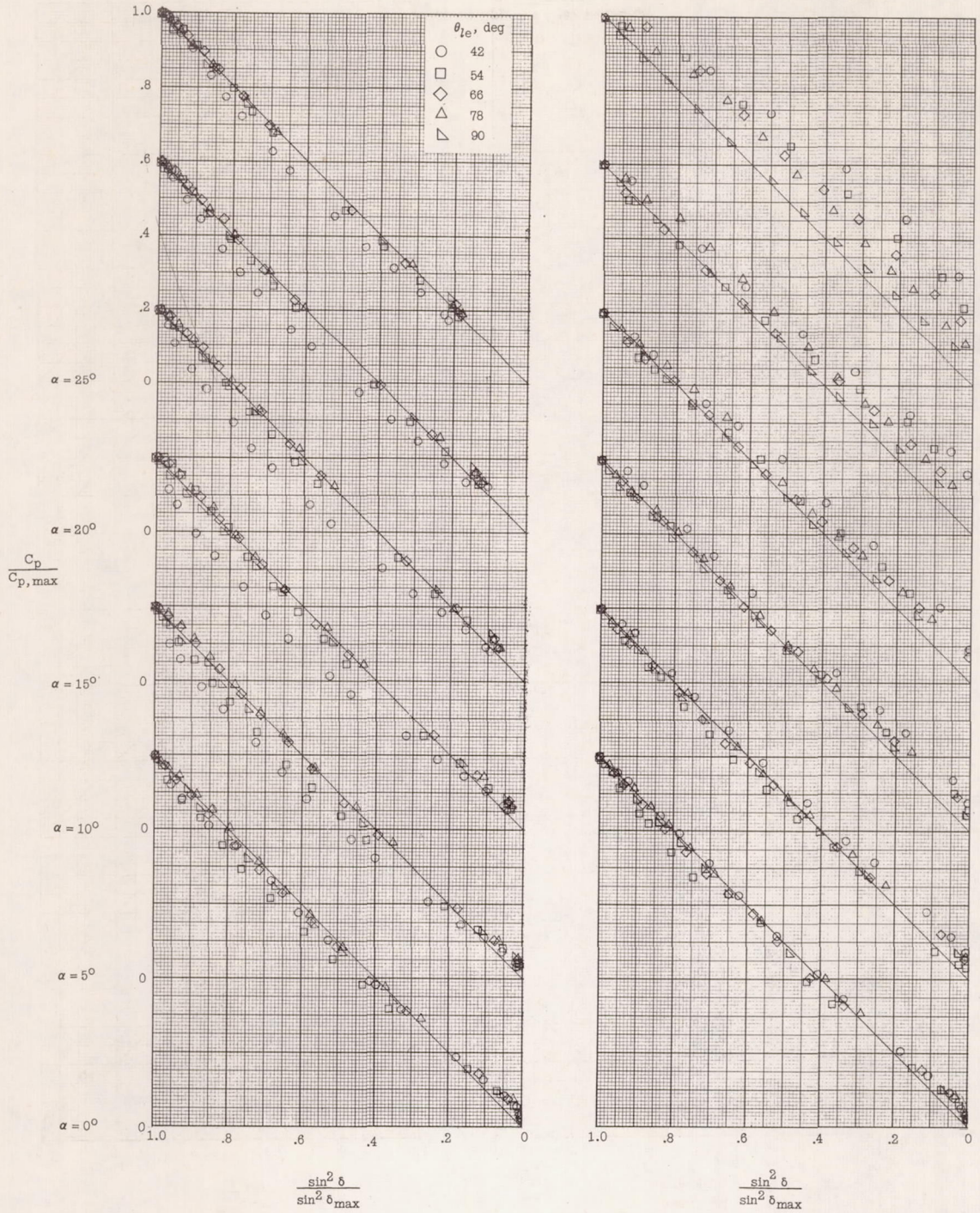
Figure 13.- Concluded.



(a) Lower surface.

(b) Upper surface.

Figure 14.- Correlation of pressure distributions with generalized Newtonian theory for two-dimensional parabolic arc models.



(a) Lower surface.

(b) Upper surface.

Figure 15.- Correlation of pressure distributions with generalized Newtonian theory for two-dimensional circular arc models.