primary importance when the number of layers is relatively small. This analysis can be easily reduced to treat plates with two distinct facings and a single core. This analysis is applicable for sandwich plates with thick or thin cores provided the facings are not so thick as to introduce appreciable transverse shear deformation in addition to that of the cores.

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Transonic Flows by Coordinate Transformation

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NUMERICAL solutions of transonic flows about two dimensional airfoils have been obtained by Murman and Cole[1] by integration of the transonic small disturbance equation in a finite domain around the airfoil. The far field boundary conditions are derived analytically but they have to be periodically recalculated during the computation.

This problem is avoided if the infinite domain around the airfoil is transformed into a finite one by a transformation of the independent variables x,y to the variables suggested by Sills,[2] e.g., the variables $\xi = \tanh \alpha x$ and $\eta = 1 - e^{-\beta y}$.

In the new coordinate system, the domain being defined by $-1 \leq \xi \leq 1$ and $0 \leq \eta \leq 1$, the small disturbance equation becomes

$$\alpha^2(1-\xi^2)[(1-\xi^2)\phi_{\xi\xi} - 2\xi\phi_\xi][(1-M_\infty{}^2) - (\gamma+1)\alpha M_\infty{}^2(1-\xi^2)\phi_\xi] + \beta^2(1-\eta)[(1-\eta)\times \phi_{\eta\eta} - \phi_\eta] = 0 \quad (1)$$

and the exact boundary condition on the boundaries $\xi = \pm 1$ and $\eta = 1$ is $\phi = 0$. Along the axis, $\eta = 0$, the boundary condition is given, e.g., by $\phi_\eta = 0$, fore and aft of the airfoil, and by $\phi_\eta = F'(\xi)/\beta$ along the airfoil; $F(\xi)$ being the airfoil shape. Thus, the numerical process is reduced to seeking a relaxation solution in the finite domain, without the need of computing the far field values.

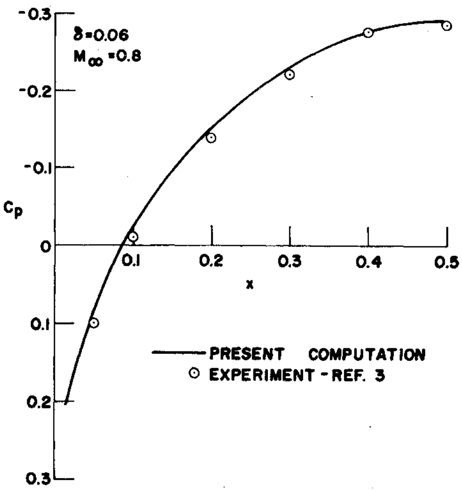

Fig. 1 Pressure coefficient along nonlifting circular arc airfoil.

A typical numerical solution of Eq. (1) for a nonlifting circular arc airfoil of thickness $\delta = 0.06$, at a freestream Mach number of 0.8, is presented here for illustrative purposes. The calculation employs a coarse mesh $\Delta\eta \simeq \Delta\xi = 0.05$ with $\alpha = \beta = 1$ and a point relaxation technique; the result is shown in Fig. 1 and compared with the experimental data of Knechtel.[3]

The computation has been repeated by using the approach of Murman and Cole. For comparable accuracy it has been found that the transformation affords considerable savings in computational time.

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Aerodynamic Characteristics of Slender Wedge-Wings in Hypersonic Strong Interaction Flows

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THE purpose of this Note is to apply the results obtained by the present authors in Ref. 1 to predict the aerodynamic characteristics of slender two-dimensional wedge-wings in hypersonic strong interaction flow. In Ref. 1 the hypersonic strong-interaction flow over an inclined surface was analyzed using an asymptotic expansion in inverse powers of the inter-

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