Table 1 Axisymmetric stagnation point shear stress, τ_w, for $Pr = 0.27$

g_o	1.0	0.5	0.1	0.05	0.01	0.001
(a) $C = 1$	0.928	0.835	0.754	0.740	0.740	0.740
(b) $C = g_o^{-1/2}$	0.928	0.749	0.596	0.576	0.559	0.556
(a)/(b)	1.0	0.898	0.790	0.772	0.756	0.751

stress, τ_w, for $C = 1.0$ with that for C varying inversely as the square root of the local temperature. Calculations were performed using the method of Ref. 2.

The results of Nath ($C = 1$) are related to more realistic variable C data through some function of g_o which is not known until the full problem is solved. It is thus seen that Ref. 1 is an exercise in applying a poorly chosen method to unrealistic problems. The present Comment attempts to obviate possible misinterpretations which could tempt fluid dynamicists to follow the course chosen by Nath.[1]

References

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Reply by Author to W. J. Franks

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In Ref. 1, an application of the method of parametric differentiation to the solutions of boundary-layer equations in magnetofluiddynamics and in non-Newtonian fluid mechanics was presented. The aim of the analysis was to show that the method can be applied successfully to complex flowfields containing a number of parameters. For the first problem, it has been pointed out by Bush[2] and also verified by the present author that the usual method of solving two-point boundary-value problems, i.e., the method of shoot and hunt fails for large value of the magnetic parameter $M(M > 10)$ even under the simplifying assumptions of $Pr = 1$ and constant density–viscosity product, i.e., $c = \rho\mu/\rho_e\mu_e = 1$. In our analysis, we assumed $c = 1$ because we wanted to compare our results with the corresponding results obtained by a shoot and hunt scheme which were available to the author for the case $c = 1$. It may be remarked that the present method of solution is valid even for $M = 100$, but the results for $M > 10$ were not tabulated in Ref. 1 because no comparison could be made.

In fact, for $c = g^{-1/2}$, Nath[3,4] has obtained the solution of the above problem using a shoot and hunt scheme and the method of parametric differentiation. Further, the solution of general three-dimensional stagnation point has been obtained by Vimala[5] using the method of parametric differentiation for $c = g^{-1/2}$ in contrast to $c = 1$ as considered by Libby.[6] The inadequacy of solutions obtained under simplifying assumption of $c = 1$ is well known. However, it is a common practice to use such an assumption.[2,6]

In view of the abovementioned results, the comment of Franks that the method is ill suited for the solutions of the boundary-layer equations is not justified. On the other hand, it can be concluded that the method of parametric differentiation is another powerful technique for solving boundary-layer equations with realistic property variations.

Received March 7, 1974.

Index category: Boundary Layers and Convective Heat Transfer—Laminar.

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Errata

A Study of Compressible Potential and Asymptotic Viscous Flows for Corner Region

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[AIAA J **12**, 355–359 (1974)]

Equation (13) should read:

$$U_{1,c} = -\frac{\beta}{2m}\left[\frac{[(x^2+m^2y^2)^{1/2}-x]^{1/2}}{(x^2+m^2y^2)^{1/2}} + \frac{[(x^2+m^2z^2)^{1/2}-x]^{1/2}}{(x^2+m^2z^2)^{1/2}}\right] \quad (13)$$

The last paragraph in the subsection "Subsonic Flow" should read:

For the compressible flow velocities given by Eqs. (13–15), the quantity β has the same significance as expressed in Eq. (5), although its numerical value will be, in general, different from that for incompressible flow.

Received April 15, 1974.

Index categories: Supersonic and Hypersonic Flow; Jets, Wakes, and Viscid-Inviscid Flow Interactions.