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[4] Terrill, R M , 'Laminar boundary-layer flow near separation with and without suction," Phil Trans Roy Soc (London) **A253,** 55–100 (1960)

Reply by Author to R M Terrill

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THE writer had not been aware of Terrill's exact solution[1] for sinusoidal velocity distribution and is pleased at the closeness of agreement of the approximate solution[2] with it

In dealing with the approximate solution near the separation point, it should be noted that a transition from use of the polynomial inner solution [Eqs (33–37)] to use of the von Kármán Millikan inner solution [Eqs (29–32)] takes place when the velocity profile inflection point occurs at a dimensionless stream-function value z greater than 0 15 A small discontinuity in the boundary-layer parameters is

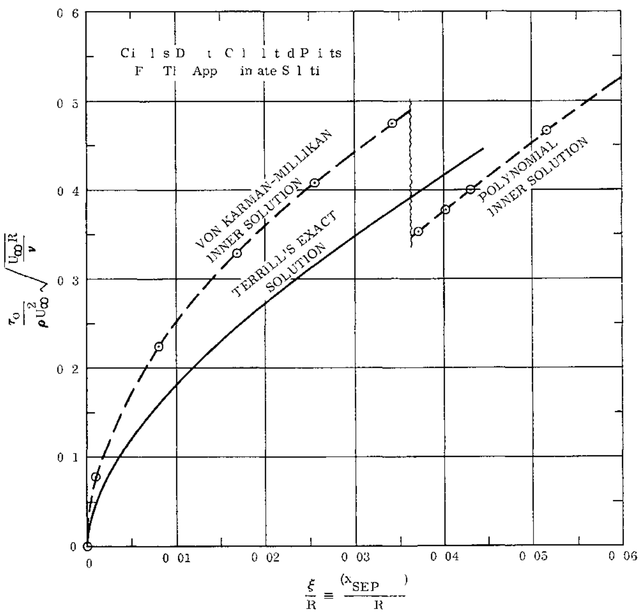

Fig 1 Shear stress near separation point, sinusoidal velocity distribution, $U_a = 2U_\infty \sin(X/R)$

associated with this transition, as shown in Table 1 for the sinusoidal velocity distribution Note that the nondimensional shear-stress value reported in Table 4 of Ref 2 for $\eta = 100°$ was in error, and should be 0 40

Although the approximate solution errs in predicting separation too soon (in this example), the variation of shear stress with distance from the separation point is similar to that calculated by Terrill, as shown in Fig 1 The good agreement in displacement and momentum thickness at the separation point is related to this

Also, it may be noted that the value of $C = 0\ 788$ used in the approximate solution is, to some extent, arbitrary and was determined at the forward stagnation point It is possible that a different value of C would give better agreement in the vicinity of the separation point

Table 1 Approximate solution results for sinusoidal velocity distribution

$\eta°$	Inner solution	$\frac{\tau_0}{\rho U_\infty^2}\left(\frac{U_\infty R}{\nu}\right)^{1/2}$	$\delta^*\left(\frac{U_\infty R}{\nu}\right)^{1/2}$	$\theta\left(\frac{U_\infty R}{\nu}\right)^{1/2}$
0	Polynomial	0	0 456	0 203
30	"	1 62	0 481	0 212
60		2 22	0 580	0 250
90		1 26	0 918	0 357
100		0 40	1 372	0 443
100 33		0 35	1 409	0 447
100 5	von Kármán-Millikan	0 47	1 328	0 443
101	"	0 41	1 376	0 449
101 5		0 33	1 438	0 456
102		0 22	1 527	0 463
102 40		0 08	1 671	0 471
102.46		0.00	1 759	0 472

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Comment on "A Class of Linear Magnetohydrodynamic Flows"

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IN a recent note[1] the characteristics of steady-state magnetohydrodynamic flows of an incompressible, electrically conducting fluid with constant scalar properties were examined with respect to the functional dependence of the solutions that would be necessary to linearize the governing equations Two cases were specifically considered and solutions presented Closer examination of the problem shows that the results obtained are more restrictive than is immediately obvious, and the following analysis is presented to show exactly the limitations implied by the interactions among the assumptions in each of the two cases The symbols have their usual meaning, and the mks system of units has been used

In case 1, the form of the velocity and magnetic field [$\mathbf{V} = \mathbf{i}u(y,z)$ and $\mathbf{B} = \mathbf{i}B_x(y,z) + \mathbf{k}B_0$] is such that the continuity equation and the divergence relation for $\mathbf{B}$ are identically satisfied An expansion of Ampere's law shows that $J_x = 0$, and a subsequent expansion of Ohm's law shows that $E_x = 0$ Eliminating the current between Ohm's law and the divergence relation, and acknowledging the divergence relation for $\mathbf{E}$ gives the result $\partial u/\partial y = 0$ or, integrating, $u = u(z)$ This shows that the form of the assumed relation for the velocity is too general to be compatible with the functional forms of the other variables

The momentum equation may now be expanded to give

$$\partial P/\partial x = B_0 J_y + \mu(d^2u/dz^2) \tag{1}$$

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