

are stable as long as condition (5) is satisfied. It is clear that condition (5) can be inverted by writing the amplification factor for Δy . Then all positive and negative values of u and v are, in principle, permissible.

Although the stability conditions given here were derived for the linearized equations of motion, the integration of the numerically exact difference equations shows that these conditions hold also true for the nonlinear problem. This can be seen in Fig. 2 taken from Ref. 4. Shown is the error of the shearing stress at the wall as a function of γ . As soon as the stability limits are exceeded, the error increases rapidly. There are other difference schemes that allow the tangential velocity components to be negative. These schemes are described in Refs. 3 and 5.

References

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Reply by Author to E. Krause

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IN his Comment E. Krause has shown that there exist stable solutions to the implicit finite-difference equations obtained from the three-dimensional boundary-layer equations. The existence of these solutions may extend the usefulness of the finite-difference techniques in three-dimensional boundary-layer theory; however, I think some further

points should first be considered and investigated. The first point that should be investigated is the following. When boundary-layer equations are used to calculate a negative velocity in a boundary layer, it is implied that the previous flow history can be obtained just from the downstream-flow data. There are many examples of flows where this condition is violated, for example, more than one upstream condition will lead to the same downstream flow. Mathematically, this point becomes one of uniqueness. Dr. Krause has shown existence, but a nonuniqueness of the solution may be possible.

Another possible problem with the difference scheme proposed by Dr. Krause is in the upper regions of the boundary layer. In this flow region the viscous terms become small and the basic mathematical character of the equations could change. A good example of this is in supersonic boundary-layer theory. In the upper regions of the boundary layer, the equations could take on an almost hyperbolic character, and if the reversed flow finite-difference equations are used, the region of the influence of the characteristic nets will be violated. This situation could bring about a stability problem of a different character.

Therefore, I feel that the reversed flow difference equations proposed by Dr. Krause should be carefully studied and tested before they are given general acceptance. However, I do feel that they could be of great value, if the aforementioned points should prove to be nonvalid.

Errata: "Buckling of Eccentrically Stiffened Cylinders under Torsion"

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IN Eq. (2c) the coefficients of the sixth derivatives (mixed or not) should be multiplied by $(\pi/L)^2$ and those of the fourth derivative by $(\pi/L)^4$. In the sixth line of Eq. (2c) λ_{zzst} should be multiplied by λ_{yy} . In the expression for α_i (see Appendix) the coefficient for the term $i^4\beta^2$ should read: $+ 2(\bar{e}_x\lambda_{zzst}\lambda_{yy} + \bar{e}_y\lambda_{yyr})$.

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