Some Properties of the Two-Dimensional Turbulent Wall Jet in a Moving Stream[1]

P. BRADSHAW.[2] We know practically nothing about the interaction between two layers of turbulence bearing opposite shear stresses but, in most duct and jet flows, symmetry produces a spurious simplicity. The authors are to be congratulated on writing a paper which shows so clearly the difficulties presented by the interaction in an asymmetrical case, a refreshing change from papers in which the authors' theory exactly fits the authors' experiments. The careful measurements in the present paper should inspire other workers to continue a fundamental attack on the interaction problem but, since a 180-deg change in shear stress direction will probably be much more difficult to sort out than the smaller changes in shear stress direction that occur in three-dimensional flows, it is, perhaps, well that quite crude calculation methods based on the law of the wall seem to give adequate predictions of gross properties in cases of practical interest.

Authors' Closure

The authors thank Mr. Bradshaw for his kind remarks and agree with the substance of his comments. There is no doubt that the change in shear stress direction, present in wall-jet flows, creates difficulties for prediction procedures. On the other hand, prediction procedures developed in the Department of Mechanical Engineering of Imperial College have been shown to yield very satisfactory predictions both in the upstream region where the elliptic differential equations are solved and in the downstream region where parabolic differential equations are solved. These solution procedures employ forms of the law of the wall and this undoubtedly accounts for some of the success.

[1] By S. C. Kacker and J. H. Whitelaw, published in the December, 1968, issue of the JOURNAL OF APPLIED MECHANICS, Vol. 35, TRANS. ASME, Vol. 90, Series E, pp. 641–651.

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