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Application of exact solutions of the Bussman-Münz equation
JOHN RUSSELL, Emeritus Professor, Florida Tech — The BUSSMAN-MÜNZ (B-M) equation is the differential equation of classical instability of the asymptotic-suction boundary layer. The B-M equation has a nonzero coefficient of the third-derivative term but is otherwise similar to the ORR-SOMMERFELD (O-S) equation. In 1950 and 1970 D. GROHNE and P. BALDWIN found integral representations of fundamental systems of exact solutions of the O-S and B-M equations, respectively. The present author has reexpresseed these and other solutions of the B-M equation in terms of the G-function of C.S. MEIJER, the result being a symmetric system of seven solutions (three of dominant-recessive type, three of balanced type, and one of well-balanced type). The present talk will present new results that include three exact connection formulas, each of which expresses the linear dependence of a subset of the symmetric system of seven solutions. The results also include application of the G-functions to computation of familiar quantities such as the critical REYNOLDS number in the temporal instability problem. If one evaluates the integral representations of the exact solutions by the method of steepest descents the form of the integration path depends upon the independent variable and undergoes a major qualitative change as the latter crosses a STOKES line. The present talk will furnish illustrations of such changes

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