

1052-76-352

Allen M. Tesdall* (atesdall@gauss.math.csi.cuny.edu), 324 Pearl St. #4-D, New York, NY 10038. *High-resolution solutions for shock formation in transonic flow.*

Shock waves that form as the result of an interaction of a rarefaction wave with a sonic line are a generic feature of solutions of transonic flow problems. Examples include (i) the sequence of shocks that occur in Guderley Mach reflection, (ii) the shock that forms at the rear of a supersonic bubble on an airfoil in a slightly subsonic free stream flow, and (iii) the shock wave that forms when a supersonic flow hits the corner of an expanding duct. Whether the shock forms on the sonic line or inside the supersonic region appears to be an open question. We present high resolution numerical solutions of problems for the steady and unsteady transonic small disturbance equations that describe examples (ii) and (iii) above. Our solutions show that the shock forms strictly inside the supersonic region. These results appear to be the first that clearly show the supersonic nature of the shock formation point. (Received September 01, 2009)