INTERACTION OF A PLANAR SHOCK WITH A CONE AT AN OBLIQUE ANGLE: NUMERICAL SIMULATION AND EXPERIMENT

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Abstract. A two- or three-dimensional Navier-Stokes hydrocode using adaptive zoning arid higher-order TVD differencing (called MAZe for Multiphase Adaptive Zoning) was used to perform a three-dimensional simulation of the interaction of a planar shock wave with a cone at an oblique angle. This configuration produces either regular or Mach reflection depending upon the azimuthal angle on the cone. The caste under investigation had an incident shock of strength Mach 1.28, a cone half-angle of 35', and an angle
of 25' between the cone axis and the shock-normal vector. An experiment using the above configuration was performed in which the cone was placed at the open end of a 230 mm diameter shock tube which consisted of a 2 m long, high-pressure chamber and a 5 m long low-pressure channel. Flow visualization was carried out with double-exposure holographic interferometry and diffuse holographic interferometry. Shock wave reflections ranging from regular to Match reflection were clearly observed for both experiment and simulation. Shock structures and triple-point trajectory angles derived from the simulation and experiment were compared.