

ABSTRACT

The reflection of very weak shock waves from concave curved surfaces has not been well documented in the past and recent studies have shown the possible existence of a variation in the reflection configuration evolution as a very weak shock wave encounters an increasing gradient on the reflecting surface. The current study set out to investigate this anomaly using high resolution photography and numerical simulations. Shock tube tests were done on various concave circular and parabolic geometries, all with zero initial ramp angle. Unlike for the stronger shock wave case, the results showed that for very weak Mach numbers, $M_s < 1.1$, there is a region in which the reflection configuration resembles that of a regular reflection. This region exists after the triple point of the Mach reflection meets the reflecting surface and prior to the formation of the additional shock structures that represent a transitioned regular reflection. The Mach and transitioned regular reflections at $1.03 < M_s < 1.05$ also exhibited no signs of a shear layer, possibly due to the lack of a clear discontinuity at the triple point.