FM5L_11049

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Unsteady Drag Force Measurements of Shock Loaded Bodies Suspended in a Vertical Shock Tube

Kazuyoshi Takayama[(1)], Mingyu Sun[(1)], Koji Tamai[(1)], Tsutomu Saito[(1)], Hiroyuki Tanno[(2)], Joseph Falcovitz[(3)]

(1) *Shock Wave Research Center, Institute of Fluid Science, Tohoku Univ., Sendai, Japan*
(2) *Kakuda Space Propulsion Research Center, Japan*
(3) *Institute of Mathematic, Hebrew University of Jerusalem, Israel*

Paper deals with experimental and numerical works of drag force measurements over a 80 mm diameter sphere. Test models were suspended in a 300 mm $\times$ 300 mm cross sectional vertical shock tube. Unsteady drag forces were measured directly with accelerometers installed inside the test models. Flow visualizations of individual shock/model interactions were visualized quantitatively with double exposure holographic interferometry and sequentially with high-speed video recording. Shock Mach number was 1.2 in air. Measured unsteady drag forces of individual bodies were compared with numerical results by solving the Euler equations and the Navier–Stokes equations with meshes of level four refinements. In addition to appearance of peak drag forces, negative drag forces appear when the transmitting shocks merge at bodies rear stagnation points.

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