

CHARACTERIZATION OF EXPLOSIVE CHARGES CONTAINING BISMUTH OR TUNGSTEN PARTICLES

G. Sutherland, R. Benjamin, T. Piatt and L. Pridgeon

U.S. Army Research Laboratory, Aberdeen Proving Ground, MD USA 21005

ABSTRACT

Experiments were performed to both determine plate momentum imparted by explosive charges containing inert tungsten (W) or bismuth (Bi) metal particles and to characterize the particle laden flow. The metal particles either surrounded a spherical explosive charge or were embedded in the explosive. The momentum of metal disks placed in a larger plate was measured by photonic Doppler velocimetry (PDV). Results for experiments where the particles were placed outside the charge indicate that Bi imparted more momentum than the W particles. In other experiments, the flow of the particle expansion cloud was measured by photonic Doppler velocimetry and high-speed framing cameras. The framing camera pictures indicate that some of the particles “clumped” together with the W particles appearing brighter than the Bi particles. The PDV showed both a range in velocities and a decrease in particle velocity with distance. Additionally, preliminary results showing particle velocity measurements in an explosively driven shock tube show this technique has promise to show features of the particle-laden flow.