

Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Shear Stress Measurements During High-Speed Impacts with Sand and Glass Beads WILLIAM COOPER, Air Force Research Laboratory, KEIKO WATANABE, Osaka University, Japan, HIROAKI YAMAMOTO, Tohoku University, Japan, KOICHI TANAKA, Chubu University, Japan, KAZUYOSHI TAKAYAMA, Tohoku University, Japan, MESO-SCALE DIAGNOSTICS COLLABORATION — Right-circular (15 mm OD x 26 mm) and spherical (10mm) projectiles were fired vertically-downward (300-1,000 m/s) into acrylic containers (100-190 mm ID) containing quartz Eglin sand and solid, amorphous glass beads. A variety of shearing conditions were observed; allowing estimation of stresses along the various shearing surfaces. Under certain conditions a false nose was formed of partially-crushed particles on the front of the projectile and the particulate media sheared along the false nose surface. The included angle of the false nose varies with impact velocity (up to a velocity of 375 m/s) and appears to be a residual artifact of initial impact conditions. An analytical model is presented to explain the false nose formation and stability during the projectile deceleration. Other impact conditions resulted in shearing along the surface or surface abrasion. Experimental and theoretical results will be presented.

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Date submitted: 08 Dec 2010

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