Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Ballistic Penetration of Sand With Small Caliber Projectiles
JOHN BORG, ANDREW FRASER, Marquette University — In this work a series of experiments were carried out in which right-circular cylinders were launched into sand targets at velocities ranging from 70 to 150 m/s. The projectiles were launched along a view window in order to record the penetration event with high-speed photography. Stress measurements of the transmitted wave forms were simultaniouly collected from a piezoelectric load cells buried in the sand at various locations relative to the shot line. A particle image velocimetry (PIV) technique, which extracted information from the photographic images, was used to resoved both the penetration and transmitted wave profiles. Two proment waves are observed in these experiments. The first wave is a propagating compaction wave which moves at the bulk sound speed of the sand. The second is an attached bow shock fracture wave which is stationary relative to the projectile. Together these experiments further our understanding of high speed granular penetration events.

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Date submitted: 01 Mar 2011 Electronic form version 1.4