Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Universality of granular impact dynamics HIROAKI KATSURAGI, DOUGLAS DURIAN, University of Pennsylvania — We dropped projectiles into granular media from various heights, and measured the dynamics by an optical method with 100 nanometer and 20 microsecond resolution. Data were obtained for 11 different projectiles (including cylinder as well as spheres) and 4 different granular media. The results can all be explained by a stopping force consisting of the sum of two terms: an inertial drag, proportional to velocity squared and independent of depth, and a frictional drag, proportional to depth and independent of speed. The latter scales as the square-root of projectile density and hence is not simply Coulomb friction. We also demonstrate that this stopping force law can explain seemingly-contradictory penetration and dynamics data reported by other researchers.

Hiroaki Katsuragi
University of Pennsylvania

Date submitted: 15 Nov 2006 Electronic form version 1.4