Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Impact on porous targets: penetration, crater formation, target compaction and ejection[1] EDUARDO BRINGA, CONICET and Instituto de Ciencias Basicas, Universidad Nacional de Cuyo, Mendoza, 5500 Argentina, CHRISTIAN RINGL, HERBERT URBASSEK, Fachbereich Physik und Forschungszentrum OPTIMAS, Universitat Kaiserslautern, Erwin-Schrodinger-Straße, D-67663 Kaiserslautern, Germany — Using a granular-mechanics code, we study the impact of a sphere into a porous adhesive granular target, consisting of monodisperse silica grains. The model includes elastic repulsive, adhesive and dissipative forces, as well as sliding, rolling and twisting friction. Impact velocities up to 30 m/s, and target filling factors (densities) between 19% and 35% have been systematically studied. We find that the projectile is stopped by an effective drag force which is proportional to the square of its velocity. Target adhesion influences projectile stopping only below a critical velocity, which increases with adhesion. The penetration depth depends approximately logarithmically on the impact velocity, and is inversely proportional to the target density. The excavated crater is of conical form and is surrounded by a compaction zone, whose width increases, but whose maximum value decreases with increasing target density. Grain ejection increases in proportion with impactor velocity and the angular distribution of the ejecta has a maximum around 45 degrees respect to the surface normal.

[1]This work has been supported by the Deutsche Forschungsgemeinschaft via the Graduiertenkolleg 814. E.M.B. acknowledges support from CONICET, SeCTyP (U.N. Cuyo), and PICT-2009-0092.

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Date submitted: 09 Apr 2013 Electronic form version 1.4