Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

The Effect of Particle Size on the Erosion of Lunar Regolith from a Spacecraft Landing KYLE BERGER, BRENDAN BROWN, Univ of Colorado - Boulder, PHILIP METZGER, NASA Kennedy Space Center, CHRISTINE HRENYA, Univ of Colorado - Boulder — The ejection of regolith from a spacecraft landing on an extraterrestrial body (Moon, Mars, etc.) can be extremely hazardous to anything near or possibly even far from the landing point. Models currently being used to describe this phenomenon use single particle trajectories and thus ignore the effects of inter-particle collisions. We seek to improve those models by incorporating the effects of collisions. We model the system using the discrete element method (DEM), which models the particles individually using Newton's laws and thus explicitly includes inter-particle collisions. The current study focuses on the effect of particle size, both in monodisperse systems, as well as polydisperse systems using binary and continuous particle size distributions (PSDs). While collisions above the surface are rare in the monodisperse case (about 0.0001% of eroded particles), they are relatively frequent in the binary case, particularly between unlike particle species (about 1-5% of eroded large particles). It is expected that as the size disparity becomes larger, which is the case for lunar regolith as it spans at least three orders of magnitude in size, this effect becomes enhanced. Differences in particle size can result in differences in velocity, leading to interesting phenomena.

Kyle Berger
Univ of Colorado - Boulder

Date submitted: 30 Jul 2014 Electronic form version 1.4