Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Mesoscale Simulations of Granular Materials with Peridynamics[1]
CHRISTOPHER LAMMI, Georgian Institute of Technology, DAVID LITTLEWOOD, TRACY VOGLER, Sandia National Laboratories — The dynamic behavior of granular materials can be quite complex due to phenomena that occur at the scale of individual grains. For this reason, mesoscale simulations explicitly resolving individual grains with varying degrees of fidelity have been used to gain insight into the physics of granular materials. The vast majority of these simulations have, to date, been performed with Eulerian codes, which do a poor job of resolving fracture and grain-to-grain interactions. To address these shortcomings, we utilize a peridynamic modeling framework to examine the roles of fracture and contact under planar shock and other loading conditions. Peridynamics is a mesh-free Lagrangian technique that uses an integral formulation to better enable simulations involving fracture. Although some aspects of the peridynamic codes currently available are not well suited to the shock regime, the simulations provide results that are more physically realistic than the Eulerian simulations for some non-planar loading conditions.

[1]Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE

Tracy Vogler
Sandia National Laboratories

Date submitted: 22 Feb 2011 Electronic form version 1.4