Abstract Submitted
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Investigating the shock response of dry and water-saturated sand: flyer-plate experiments and mesoscale simulations[1] JEFF LAJEUNESSE, JOHN BORG, Marquette University, SARAH STEWART, University of California Davis, NARESH THADHANI, Georgia Institute of Technology — The effect of grain size and moisture content on the dynamic response of high purity, Oklahoma #1, sand was explored by performing uniaxial planar impact experiments on samples sieved to either fine (0.075 - 0.150 mm) or coarse (0.425 - 0.500 mm) grain sizes in either dry or fully water-saturated conditions. Sand samples were dynamically loaded to pressures between 1-11 GPa. Three-dimensional mesoscale simulations using CTH were created to model the response of each permutation of sand sample. Particle velocity profiles measured from the rear surface of the sand reveal that fine grain samples have steeper rise characteristics than coarse grain samples and water-saturated samples have an overall much stiffer response than dry samples. The experimentally determined particle-shock velocity response of dry sand was linear, with little difference between the two grain sizes investigated. The experimental response for the water saturated sand exhibited a piecewise continuous response with a transition region between pressures of 4.5 – 6 GPa. Hypotheses for the cause of this transition region are drawn based on results of the mesoscale simulations.

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