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2D Mesoscale Simulation of Shock Response of Dry Sand in Plate Impact Experiments L. PEI, R.D. TEETER, S.K. DWIVEDI, Y.M. GUPTA, Institute for Shock Physics, Washington State University — The one-dimensional approach with a homogenized continuum model used in the literature to derive the shock Hugoniot of sand from plate impact experimental data neglects heterogeneous deformation and cannot incorporate mesoscale phenomena. We present a 2D mesoscale simulation approach to probe the shock response of dry sand with the main objectives to identify important mesoscale phenomena and the role of inter granular friction. The in-house code ISP-SAND was used to generate sand with desired grain size distribution and porosity. The explicit finite element code ISP-TROTP was used to simulate plate impact experiments of assumed configurations. The deformation of individual sand grains was modeled by non-linear mean stress volume compression relation with an assumed mean stress dependent yield strength. The results show heterogeneous deformation with finite lateral velocity and regions of stress concentrations in the sand sample. The effects of grain size distribution, porosity and friction between grains are discussed by comparing the particle velocity profiles at the window interface. Work supported by DOE and AFOSR.

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