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Intragranular fracture and frictional effects in granular materials under pressure-shear loading AMANDA PETERSON, JOHN FOSTER, The University of Texas at San Antonio, TRACY VOGLER, Sandia National Laboratories — Research efforts have been undertaken in recent years to investigate the dynamic behavior of granular materials. Many of the investigations have been experimental in nature, consisting of several rounds of Kolsky bar tests on sand with varying moisture content and confining pressures as well as traditional plate impact. More recently, pressure-shear experiments on both sand and granular tungsten carbide have been performed. In order to investigate the mesoscale physics that affect the bulk response observed in experiments, we have undertaken a computational simulation effort. The simulations are conducted using a massively parallel computational peridynamics code capable of modeling many thousand individual grains at high resolution resulting in simulations that consist of several million degrees of freedom. Individual intragranular fracture and discrete contact with friction are modeled explicitly in the simulations. Thus, these simulations treat aspects of the problem that were not represented well in previous mesoscale simulations with Eulerian hydrocodes. Results from these simulations are compared with results from pressure-shear experiments on sand and granular tungsten carbide. A discussion of the effects of fracture and friction on force chain formation and bulk wave propagation in the samples is included.

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