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Modeling perturbed shock wave decay in granular materials with intra-granular fracture MASOUD BEHZADINASAB, Univ of Texas, Austin, TRACY VOGLER, Sandia National Laboratories, JOHN FOSTER, Univ of Texas, Austin — Shock wave perturbation decay experiments have recently been explored as a tool to probe the high-rate shear response of granular materials. This dynamic behavior involves complex intra- and inter-granular phenomena. Mesoscale simulations can give insight into this complexity by explicitly resolving the deformations and interactions of individual grains. Peridynamics, a nonlocal continuum thoery, provides a suitable framework for modeling dynamic problems involving fracture. Previous research has focused mostly on the continuum, bulk response, neglecting any localized material failure, of granular materials. A systematic investigation on the effects of frictional contact forces and grain fracture on the continuum behavior of granular materials is carried out by peridynamic simulations of shock wave perturbation decay experiments. Sensitivity assessment of dominant factors indicates that intra-granular fracture, a phenomenon ignored in most computational investigations of granular materials, plays a large role in the bulk dynamic response.

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