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Meso-Scale Heating Predictions for Weak Impact of Granular Energetic Solids[1] ROHAN PANCHADHAR, KEITH GONTHIER[2], Louisiana State University — An explicit, 2-D, Lagrangian finite and discrete element technique is used to computationally characterize meso-scale fluctuations in thermomechanical fields within piston supported low pressure deformation waves propagating through particulate energetic solids. The numerical technique combines conservation principles with a plane strain, thermoelastic-viscoplastic and friction constitutive theory, and an energy consistent, penalty based contact interaction model, to describe deformation and motion of individual particles. Emphasis is placed on characterizing the relative importance of plastic and friction work as heating mechanisms which may cause bulk ignition of these materials. Predictions indicate that, in addition to low speed impact (< 200 m/s), friction work is an important heating mechanism at higher impact speeds. The variation in spatial partitioning of energy within the spatial deformation wave structure, and its variation with piston speed (50-500 m/s) and particle size distribution, is demonstrated.

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