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Computational Analysis of Compaction Wave Interactions with Non-Planar Boundaries[1] ANIRBAN MANDAL, ROHAN PANCHADHAR, KEITH GONTHIER[2], Louisiana State University — The interaction of initially planar, piston supported compaction waves with a stationary, convex rigid boundary is computationally examined at both the bulk and meso-scales. The bulk-scale model accounts for elastic and inelastic volumetric deformation of the granular material, and hot-spots formed at the grain scale are estimated based on a simple bulk energy localization strategy. The meso-scale model combines conservation principles with an elastic-viscoplastic and friction constitutive theory to predict thermomechanical fields within grains, and accounts for interaction between grains using an efficient penalty based technique. Particular emphasis is placed on characterizing the variation in spatial wave structure and hot-spot mass fraction in the vicinity of the boundary with piston speed (100-500 m/s). Meso-scale fields are locally averaged and compared to those predicted by the bulk model; good agreement exists. Predictions indicate that maximum heating occurs near the boundary away from the stagnation region.

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