Abstract Submitted
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Modeling Pyrotechnic Explosions ALLEN KUHL, DAVID GROTE, Lawrence Livermore Natl Lab — We describe a hydrodynamic model of the flow field created by pyrotechnic explosions. It is based on a 3-phase version of our AMR code. It contains the following elements: (i) a gas-dynamic model of the expansion and mixing in the fireball, (ii) a Discrete Lagrangian Particles model of the burning projectiles, and (iii) a heterogeneous continuum model of the particle wakes. The 3 sets of conservation laws are coupled through drag and heat transfer with the gas; also, the projectiles loose mass, creating a mass source for the wakes. Adaptive Mesh Refinement: AMR (Bell et al., 1996) is used to capture turbulent mixing and combustion on the grid. The grid was initialized with similarity solutions for: (i) the detonation products (Kuhl 2015) and (ii) the particles (Stanyukovich 1960)thereby defining the particular pyrotechnic charge configuration to be studied. The 3 sets of hyperbolic conservation laws were integrated with our high-order Godunov schemes (Bell et al. 1989). Results of the numerical simulations will be compared with data from pyrotechnic explosion tests. Most striking is the bright turbulent combustion structures in the fireball and the bright streamers formed by combustion of the DLP-wake systems.

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