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Ignition threshold of aluminized HMX-based PBXs[1] CHRISTOPHER MILLER, MIN ZHOU, Georgia Institute of Technology — We report the results of micromechanical simulations of the ignition of aluminized HMX-based PBX under loading due to impact by thin flyers. The conditions analyzed concern loading pulses on the order of 20 nanoseconds to 0.8 microseconds in duration and impact piston velocities on the order of 300-1000 ms^{-1}. The samples consist of a stochastically similar bimodal distribution of HMX grains, an Estane binder, and 50 μm aluminum particles. The computational model accounts for constituent elasto-vicoplasticity, viscoelasticity, bulk compressibility, fracture, interfacial debonding, fracture, internal contact, bulk and frictional heating, and heat conduction. The analysis focuses on the development of hotspots under different material settings and loading conditions. In particular, the ignition threshold in the form of the James relation and the corresponding ignition probability are calculated for the PBXs containing 0%, 6%, 10%, and 18% aluminum by volume. It is found that the addition of aluminum increases the ignition threshold, causing the materials to be less sensitive. Dissipation and heating mechanism changes responsible for this trend are delineated.

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Christopher Miller
Georgia Institute of Technology

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