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Hot spot criticality in shocked octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine over a range of pores sizes and pressures H. KEO SPRINGER, SORIN BASTEA, JAMES GAMBINO, Lawrence Livermore National Laboratory — Novel continuum hot spot models for explosives now incorporate information on pore size distribution. However, there is a limited understanding of the participation of different sized pores in shock initiation scenarios. The objective of this simulation-based study is to determine the criticality of single hot spots as a function of circular pore diameter and shock pressure. We also study sensitivities to thermal diffusion, the strength model, and the kinetic model. Simulations are performed with the multi-physics hydrocode, ALE3D. A coupled thermochemical code provides the equation-of-states, thermal transport properties, and the chemical kinetics. We also employ a strain, strain-rate, and pressure-dependent strength model. Strain-rate hardening has been shown to enhance shear and temperature localization during pore collapse which can accelerate the time to ignition. Based on our calculations, we develop a simplified ignition criterion and compare to existing hot spot criticality models. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-768077

H. Keo Springer
Lawrence Livermore Natl Lab

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