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Mesoscale modeling of TATB-HMX explosive mixtures H. KEO SPRINGER, SORIN BASTEA, LARRY FRIED, CRAIG TARVER, BRADLEY WHITE, Lawrence Livermore National Laboratory — TATB has outstanding safety characteristics but unremarkable initiability and corner turning response. Previous studies have shown that the addition of HMX to TATB formulations enhance shock sensitivity and detonation properties. However, the microscale mechanisms underlying such changes are not well understood. In this study, we numerically investigate the shock response of different TATB-HMX mixtures and examine changes to the unreacted equation of state (UEOS), reaction rate, and reaction zone size. Mesoscale simulations are performed with the multi-physics hydrocode, ALE3D, and coupled to a thermochemical code for the equation of state and the chemical kinetic properties. Simulations are performed for TATB-HMX-Kel F mixture ratios of 75-20-5, 50-45-5, and 20-75-5 with a fixed porosity. A range of shock pressures are considered. Initial results show that the UEOS does not dramatically change with mixture ratio, but the degree of reactivity increases with HMX content. These studies are important for developing properties used in reactive flow models especially when the constituents are mixed at length-scales below the reaction zone size. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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