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Numerical study on tailoring the shock sensitivity of TATB-based explosives using mesostructural features[1] H. KEO SPRINGER, LLNL — Advanced manufacturing techniques offer control of explosive mesostructures necessary to tailor its shock sensitivity. However, structure-property relationships are not well established for explosives so there is little material design guidance for these techniques. The objective of this numerical study is to demonstrate how TATB-based explosives can be sensitized to shocks using mesostructural features. For this study, we use LX-17 (92.5%wt TATB, 7.5%wt Kel-F 800) as the prototypical TATB-based explosive. We employ features with different geometries and materials. HMX-based explosive features, high shock impedance features, and pores are used to sensitive the LX-17. Simulations are performed in the multi-physics hydrocode, ALE3D. A reactive flow model is used to simulate the shock initiation response of the explosives. Our metric for shock sensitivity in this study is run distance to detonation as a function of applied pressure. These numerical studies are important because they guide the design of novel energetic materials. LLNL-ABS-724986.

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