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**3D Simulations of Void collapse in Energetic Materials.** NIRMAL KUMAR RAI, H.S. UDAYKUMAR, The University of Iowa — Voids present in the microstructure of heterogeneous energetic materials effect the sensitivity towards ignition. It is established that the morphology of voids can play a significant role in sensitivity enhancement of energetic materials. Depending on the void shape, sensitivity can be either increased or decreased under given loading conditions. In the past, effects of different void shapes i.e. triangular, ellipse, cylindrical etc. on the sensitivity of energetic materials have been analyzed. However, most of these studies are performed in 2D and are limited under the plain strain assumption. Axisymmetric studies have also been performed in the past to incorporate the 3D effects, however axisymmetric modeling is limited to only certain geometries i.e. sphere. This work analyzes the effects of various void shapes in three dimensions on the ignition behavior of HMX. Various void shapes are analyzed including spherical, prolate and oblate speheroid oriented at different orientations, etc. Three dimensional void collapse simulations are performed on a single void to quantify the effects void morphology on initiation. A Cartesian grid based Eulerian solver SCIMITAR3D is used to perform the void collapse simulations. Various aspects of void morphology i.e. size, thickness of voids, elongation, orientation etc. are considered to obtain a comprehensive analysis. Also, 2D plane strain calculations are compared with the three dimensional analysis to evaluate the salient differences between 2D and 3D modeling.

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