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A microtomographic toolchain to build models of energetic material microstructures at different level of complexity STEVE BELON, CEA, DAM, GRAMAT, F-46500 Gramat, France, BENJAMIN ERZAR, CEA, DAM, GRAMAT, F46500 Gramat, France, ELODIE KAESHAMMER, CEA, DAM, GRAMAT, F-46500 Gramat, France — The initiation of solid explosives under shock loading is commonly related to the formation of hot spots. These hot spots are mainly formed at the heterogeneities of the microstructure: porosities, cracks, debondings, particle edges, etc. To study the initiation of these materials, their microstructural properties have thus to be taken into account. We use micro-computed tomography (microCT) to create 3D images of the microstructure of solid explosives. Several image processing tools have been specifically developed to characterize the microstructure of energetic materials with microCT results. Properties like granulometry of particles and pores, morphology of grains, surface characteristics of cracks... can be measured from the microCT images. Volume representations obtained through microCT are also exploited to build finite element models of the microstructure of solid explosives. Real models, including all heterogeneities identified on the microCT scans, can be simplified to study independently the influence of each microstructural parameter. Numerical simulations of shockwave propagation in heterogeneous microstructures with different level of realism are presented. These mesoscale models show that complex microstructures lead to more heterogeneous thermodynamical fields.

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