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HNS EOS Refinements and Qualitative Experimental Parameter Space Modeling COLE YARRINGTON, RYAN WIXOM, DAVID DAMM, Sandia National Labs — There remains great interest in predicting the response of energetic materials to impact stimulus from a performance standpoint. In most conventional condensed-phase energetic materials, this response is governed by characteristics of the microstructure below the macroscale. To better understand the response of energetic materials to impact, a mesoscale model has been developed. The objective of this work is to show the capability of modeling the response of heterogeneous energetic materials without relying on data fitting routines, and to use these models to investigate the physics of shock response and how they lead to shock to detonation transition. To this end, a first principles EOS was used to parameterize a variable heat capacity Mie-Gruneisen model for the condensed phase EOS. Using the realistic hot-spot states made possible by this EOS, trends from the historical parameter space of flyer impact experiments were reproduced. These results highlight the importance of the EOS in grain-scale reactive burn models, and showcase the predictive capabilities of these models when coupled with a valid unreacted EOS.

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