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Approximating Reaction Chemistry of Energetics for Critical Velocity Predictions SUSHILKUMAR KOUNDINYAN, D. BARRETT HARDIN, Air Force Research Laboratory — The ability to accurately predict temperature during simulations of explosives is essential as the chemistry driving the initiation process is highly dependent on local temperature. The current major chemical reaction models are all Arrhenius functions of temperature. Yet, temperature is the least understood and most volatile parameter in many simulations. Hence, we analyze the effect of mesh resolution on temperature for 2-D void collapse simulations with widely used models for HMX. The incorporation of chemical kinetics in thermo-mechanical simulation is computationally expensive. Yet, the effect of chemical kinetics is required to predict ignition behavior in energetic materials. The analysis presented here is our first step at finding an approximation of reaction chemistry using non-reactive simulations. To that effort, a series of non-reactive HMX single void collapse simulations are performed at various shock loading conditions and Tarver critical hot spot curve is used to approximate the critical velocity. The results are compared to simulations performed with reactive chemistry at similar loading conditions.

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