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Analysis of Compaction Shock Interactions During DDT of Low Density HMX[1] PRATAP RAO, KEITH GONTHIER, Louisiana State University — Deflagration-to-Detonation Transition (DDT) within low density HMX often occurs by a complex mechanism that involves compaction shock interactions. Piston driven DDT experiments indicate that detonation can be abruptly triggered by the interaction of a strong combustion driven shock and a lead piston supported shock, where the nature of the interaction depends on initial density and lead shock strength. These shocks induce dissipation and thermomechanical fluctuations at the meso-scale due to pore collapse resulting in hot-spots. Inert meso-scale simulations of successive shock loading of low density HMX are performed to examine how dissipation and hot-spot formation are affected by initial density, and lead and trailing shock strength. Emphasis is placed on interpreting solutions in a phase space expressed in terms of effective pressure and dissipative work because of their relevance to hot-spot formation. Meso-scale predictions are shown to compare favorably to those given by a macro-scale theory. This information is being used to formulate a dissipation-dependent reactive burn model to describe shock desensitization and DDT. Preliminary redictions will be presented that illustrate how initial density and input shock strength can affect the transition mechanism.

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