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DPDE Particle Method as a Generic Tool to Simulate the Mesoscale Response of HE Composites[1] SUNIL DWIVEDI, School of Materials Science Engg., Georgia Institute of Technology, Atlanta, GA 30332, JOHN BRENNAN, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD 21005, PARVEEN SOOD, School of Materials Science Engg., Georgia Institute of Technology, Atlanta, GA 30332 — Further developments and simulation results are presented that take the DPDE method closer to becoming a generic multi-scale computational method for the simulation of the shock response of HE at micron scales. In our initial application, the Hardy's averaging method yielded an in situ density in the shock state dependent on the particle size and inter-particle separation. The method was augmented to retrieve a density independent of these two variables. Second, the impactor-sample was modeled as a monolith with no interfacial separation. This was relaxed by introducing a contact algorithm to impose impenetrability and surface friction conditions. Simulation results show that the DPDE method predicts the quasi-static response and 1D transient heat conduction in agreement with the analytical solution. The simulated shock response of RDX is in reasonable agreement with shock propagation theory with contact interactions and separation at the impactor-sample interface. It is concluded that the DPDE method, as envisioned, may provide a unified multi-scale computational framework with inherent heat transport solution to simulate the shock response of HE that is independent of the particle size and inter-particle distance.

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