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Dynamic Response Modeling of Materials Structured at the Grain-Scale

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Advanced manufacturing methods have given researchers additional control over the creation of complex structures, at the sub-millimeter length scale, for use in inert and energetic material applications. While the dynamic behavior and reactivity in energetic materials are typically dictated by their stochastic microstructures and formulation (particle size, constituents, weight percentages), the added benefits resulting from advanced manufacturing techniques are not entirely known. Through modeling we are examining the effects of material architecture on the shock and detonation wave dynamics in energetic materials using modeling at the continuum and grain scales. Wave interactions between different energetic materials and energetic with inert materials are of interest, as well as length scale dependencies due to local architecture and composition. This work will give insight into correlating mixing and behavior at the grain-scale level to the continuum level response.
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