Abstract Submitted
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Microstructure evolution of reactive powder mixtures during shock compression via two-point correlation functions[1] MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB, OH 45433, AUSTIN GERLT, Materials and Processes Division, UES, Inc. Dayton, OH 45432, ADAM PILCHAK, ERIC PAYTON, REJI JOHN, MICHAEL UCHIC, SHELDON SEMIATIN, Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB, OH 45433 — Reactive powder mixtures form heterogeneous multiphase networks and attain complex topologies during manufacturing. The microstructural topology of distended and fully dense reactive powder mixtures evolves during shock compression, and the response will depend on both the starting and intermediate microstructural configurations. This work employs two-point correlation functions along with meso-scale hydrocode simulations to capture the time-dependent microstructural topology of reactive powder mixtures. Real microstructures are extracted via montage serial sectioning from isostatically-compacted and extruded reactive powder mixtures of Ni+Al, Ti+Al, and Ti+B, which are used for direct numerical simulation of shock compression. Two-point correlations between phases and field variables link the starting microstructural configuration to the shock compression response.

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