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Intense Shock Compression of Porous Mixtures: Application to Tungsten Carbide Powders GREGG FENTON, DENNIS GRADY, Applied Research Associates, TRACY VOGLER, Sandia National Laboratories — The intense shock states achievable within granular or porous mixtures can be quantified through the application of continuum thermodynamic models. Here emphasis is on distended granular solids for the purpose of calculating compression paths and shock temperatures. In the present paper thermo-physical relations are developed and applied to the shock compression of tungsten carbide powders. This material has been selected because of previous studies available in literature and recent high-pressure test results obtained at the Sandia National Laboratories Z-Facility. The relations developed herein have been implemented in the Sandia Laboratories CTH code, specifically within a newly modified version of the $P - \lambda$ equation of state. Analytic equations of state similar to $P - \lambda$ are usually considered highly inefficient for hydrocode computation because of the many sub-cycle calculations needed to determine the pressure. However, the main advantage of this newly modified EOS is it allows for the easy creation of novel heterogeneous mixture models, which are usable from the low-pressure crush-up response to the extreme pressure and temperature states of the mixture. Comparison between numerical simulation using the new model and experimental data show good agreement.

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