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Constitutive modelling of shock compression of porous materials with two condensed constituents A.D. RESNYANSKY, WCSD, Defence Science and Technology Group, PO Box 1500, Edinburgh SA 5111, Australia — Condensed constituents of porous materials in many civilian and military applications are usually heterogeneous either by phase or by constituent composition. In particular, the gaseous phase may be critically important for the shock response of porous reactive or energetic materials. In this case a two-phase consideration appears to be very restrictive. The present work introduced a gaseous phase within the three-phase formalism. The phase characterization and phenomenological description of a porous material are realised with the use of a set of parameters representing the bulk behaviour, via the characterisation of the material as a whole, and the phase specific behaviour, via an introduction of parameters responsible for the inter-phase exchange of physical quantities. Conservation laws for the bulk parameters and constitutive equations for the inter-phase exchange parameters form a set of equations of the model. The model is realised as a code for numerical modelling to be used for analysis of the shock response of porous compositions. The analysis shows a good description of the Hugoniot experiments available in literature for graphite-metallic porous mixtures.

Anatoly Resnyansky
Defence Science and Technology Group

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