

Abstract Submitted
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An equation of state consistent with the Hugoniot abnormality

A.D. RESNYANSKY, Weapons and Combat Systems Division, DSTO, PO Box 1500, Edinburgh SA 5111, Australia — Development of Equations of State (EOSs) for description of the Hugoniot abnormality in porous materials is still of interest to physicists. The Mie-Gruneisen EOS is usually a basis of such new EOSs. The present development also follows the Mie-Gruneisen EOS approach, however, complemented with the two-phase consideration of a material analyzed, which is employing simple EOSs for each of the two phases. The Hugoniot abnormality has previously been analyzed with a two-phase material model implemented in the CTH hydrocode. The analysis has shown that the inter-phase equilibrium is an important factor for manifestation of the abnormality in highly porous materials. In particular, the necessary condition was found to be the pressure and temperature equilibrium between the gaseous and condensed phases. The present work demonstrates that the abnormality in the condition of the equilibrium is routinely achieved at a sufficiently high concentration of the gaseous phase when employing the Mie-Gruneisen EOSs with constant Gruneisen parameters for the gaseous and condensed constituents. However, the effective Gruneisen parameter for the two-phase mixture cannot be routinely determined. The high-pressure sections of the Hugoniot curves obtained with the present EOS correlate with experimental data available in literature.

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