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A Single-Phase Analytic Equation of State for Solid Polyurea and Polyurea Aerogels NICHOLAS WHITWORTH, BRIAN LAMBOURN, AWE — Commercially available polymers are commonly used as impactors in high explosive gas-gun experiments. This paper presents a relatively simple, single-phase, analytic equation of state (EoS) for solid polyurea and polyurea aerogels suitable for use in hydrocode simulations. An exponential shock velocity-particle velocity relation is initially fit to available Hugoniot data on the solid material, which has a density of $\sim$1.13 g/cm^3. This relation is then converted to a finite strain relation along the principal isentrope, which is used as the reference curve for a Mie-Gruneisen form of EoS with an assumed form for the variation of Gruneisen Γ with specific volume. Using the solid EoS in conjunction with the Snowplough model for porosity, experimental data on the shock response of solid polyurea and polyurea aerogels with initial densities of 0.20 and 0.35 g/cm^3 can be reproduced to a reasonable degree of accuracy. A companion paper at this conference describes the application of this and other EoS in modelling shock-release-reshock gas-gun experiments on the insensitive high explosive PBX 9502.

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