

Abstract Submitted  
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**A Novel Equation of State for Hydrocode** MICHAEL GRINFELD,  
The US Army Research Laboratory — A novel model equation of state (EOS) for hydrocode is suggested. Models for hydrocode are usually formulated in terms of the internal energy density  $E$  and specific volume  $V$ . The suggested models include two functions  $\Delta(V)$  and  $\chi(E)$  and it is briefly called the  $\Delta\chi$ -EOS, whereas the classical Mie-Gruneisen EOS depends explicitly on a single Gruneisen function  $\Gamma(V)$  and a reference curve. Similarly to the Gruneisen function, the functions  $\Delta(V)$  and  $\chi(E)$  should be determined by comparison with experimental data. Thermodynamics distinguishes between incomplete and complete EOS. The classical thermal equations of state are the prototype of the incomplete EOS whereas the internal energy density, considered as a function of the entropy density  $S$  and specific volume, is the classical example of the complete EOS. We demonstrate both the incomplete and complete variants of the  $\Delta\chi$ -EOS. The incomplete  $\Delta\chi$ -EOS generalizes the classical incomplete EOS like the ideal gas thermal EOS, the van der Waals EOS, and the virial EOS among others. Also, we demonstrate how to recover the functions  $\Delta(V)$  and  $\chi(E)$  from the isochoric, isothermal, and/or adiabatic experiments. We present results on the computer implementation of the  $\Delta\chi$ -EOS in hydrocode.

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