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Global Equation of State for Copper JEFFREY PETERSON, KEVIN HONNELL, CARL GREEFF, J.D. JOHNSON, JONATHAN BOETTGER, SCOTT CROCKETT, Los Alamos National Laboratory — A new, tabular (SESAME format) equation of state for Cu, suitable for use in hydrodynamic simulations, is described and compared to experimental data. Pressures, internal energies, and Helmholtz free energies are tabulated as functions of temperature and density. The new equation of state builds on the theoretical investigations of Greeff, et al., (J. Phys. Chem. Solids **67**, 2033 (2006)), but extends the range of densities and temperatures covered to 10^{-5}-10^{5} g/cc and 0-10^{8}K. The static-lattice cold curve is modeled using the semi-empirical Vinet equation near ambient densities, LDA and GGA density-functional predictions at moderate compressions, and Thomas-Fermi-Dirac theory at high compressions. The Johnson ionic model, which smoothly interpolates between Debye-like and ideal-gas behavior, is employed to model contributions from atomic motion, and Thomas-Fermi-Dirac theory is used for contributions from thermal electronic excitations. Predictions for the compressibility, shock Hugoniot, thermal expansion, and heat capacity are compared with experimental data.

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