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Tabular Equation of State for Gold JONATHAN BOETTGER, KEVIN HONNELL, JEFFREY PETERSON, CARL GREEFF, SCOTT CROCKETT, Los Alamos National Laboratory — A new, SESAME-type equation of state (EOS) is described for gold, suitable for use in hydrodynamic calculations. The EOS is tabulated on a rectangular temperature-and- density grid, spanning densities from 0 – 29 g/cc, temperatures from 0 – 85,000 K, and extending up to pressures of 1000 GPa. It is constructed using the standard decomposition of the pressure into a static-lattice cold curve, a thermal nuclear contribution, and a thermal electronic contribution. The cold curve is derived from a combination of empirical data and density functional theory, the thermal nuclear contribution from the Johnson model, and the thermal electronic contribution using Thomas-Fermi-Dirac theory. Pressures, internal energies, and Helmholtz free energies are tabulated as functions of temperature and density. Predictions for the room-temperature isotherm, principal Hugoniot, thermal expansion, heat capacity, and vapor pressure are compared with experimental data and with the EOS currently available in the SESAME library (SESAME 2700).

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