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Shock Compression, Adiabatic Expansion and Equation of State of Uranium Dioxide[1] K.V. KHISHCHENKO, V.E. FORTOV, I.V. LOMONOSOV, IHED RAS, Moscow, Russia, M.V. ZHERNOKLETOV, M.A. MOCHALOV, A.E. KOVALEV, I.P. TRUSOV, A.N. SHUIKIN, RFNC-VNIIEF, Sarov, Russia — Equation of state for matter over wide range of pressures and densities is interesting for modeling of physical phenomena in shock-compressed media. In the present study we have obtained data on the shock compressibility of porous uranium dioxide UO_2 samples with initial densities 4.25 and 2 g/cc up to pressures $P \approx 82$ GPa. We have also measured states of UO_2 samples in adiabatic release waves using barrier technique down to $P \sim 0.05$ GPa. We propose a semiempirical equation of state $E(P,V)$ for UO_2 optimally generalized the newly acquired and available at high energy densities experimental data. The equation of state obtained has a simple analytical form $P = P(E,V)$ and it can be used efficiently in numerical simulations of shock-wave processes.

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