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Wide-Range Multiphase Equations of State for Matter in Tabular Form and Their Applications PAVEL LEVASHOV, IHED RAS, KONSTANTIN KHISHCHENKO, IHED RAS — In this work to adapt wide-range multiphase equations of state for matter to simulations of shock-wave processes we developed two-dimensional tables of thermodynamic functions (such as pressure P and internal energy E) and their derivatives depending on specific volume V and temperature T calculated by analytic formulas. For every region of stability of every phase state the rectangular mesh was constructed so that a phase boundary passed through the nodes of the mesh. For the regions of metastable states of superheated liquid and supercooled vapor at positive pressure as well as for the regions of solid state, melting region and liquid state at negative pressure the separate mesh was generated. The values of parameters in an auxiliary point of phase diagram are found as a result of bilinear or linear interpolation. One can use (V, T), (V, P) or (V, E) as input parameters. The described way of interpolation guaranties high accuracy of calculations near phase boundaries. We present some applications of the developed equations of state for a number of problems of high energy density physics. We also plan to include the described tabular equations of state for several substances into the database on thermophysical properties at high pressures and temperatures (http://teos.ficp.ac.ru/rusbank/). The work is done under RFBR financial support, grant 04-07-90310, and the Russian Science Support Foundation, grant for talented young researchers.

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