Models of thermodynamics of materials in a wide range of pressures and temperatures

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The interaction of intense energy flows with matter leads to a change in the state of matter in a wide range of thermodynamic parameters. For example, when a target is irradiated with an ultrashort laser pulse in a thin near-surface layer of the target substance, the temperature and pressure increase at an almost constant density. Subsequently, the adiabatic expansion of the substance from the free surface into the environment occurs, and the shock wave propagates deep into the target [1].

For modeling such a process, it is necessary to know the equation of state of the target material in the entire realizable range of densities, pressures, and temperatures. In this report, a brief overview of the models of equations of state suitable for describing the properties of matter in a wide range of thermodynamic variables is presented.

[1] Abrosimov S A, Bazhulin A P, Voronov V V, Krasyuk I K, Pashinin P P, Semenov A Yu, Stuchebryukhov I A and Khishchenko K V 2012 *Dokl. Phys.* **57** 64–6