Abstract Submitted
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Equations of state for hydrocodes I.V. LOMONOSOV, IPCP RAS — The equation of state (EOS) governing the system of gas dynamic equations defines significantly accuracy and reliability of results of numerical modeling. In our report, we will formulate main mathematical and physical demands to wide-range EOS for hydrocodes. Our semi-empirical EOS model fully assigns the free energy thermodynamic potential for metals over entire phase diagram region of practical interest. It accounts for solid, liquid, plasma states as well as two-phase regions of melting and evaporation. Available now are wide-range multi-phase EOS for 30 simple and transition metals of the most practical interest. Their direct usage in computer codes leads to complicated and not economy calculations, so they are usually involved in numerical modeling in tabular form. The EOS code for calculation of tables can produce the complete set of thermodynamic derivatives (such as pressure, sound velocity, heat capacity) using any one of input pairs: volume-temperature, volume-internal energy or volume-pressure. The input grid can be linear, logarithmic or arbitrary; each point in 2D output tables is marked by symbol which indicates the physical state, such as solid, liquid, gas, plasma or mesh. We also present in our talk estimations of shock melting and evaporating and importance of these effects for results of numerical modeling.

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