Shock waves and equaton of state of matter

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The equation of state (EOS) is the fundamental property of matter defining its individual properties. EOS governs the system of gas dynamic equations and defines significantly accuracy and reliability of results of numerical modeling. In practice, it is required for numerical modeling of numerous processes arising under conditions of extreme energy densities.

In this report, we present current state of EOS problem and discuss novel experiments and results theoretical modeling. The main attention is addressed to experimental studies of shock-compressed condensed matter. The importance of shock-wave methods for generating different regions of the phase diagram is discussed in comparison with other experimental methods for different materials. Knowledge of the properties of the matter of the Earth, planets and other objects of the Solar system at high pressures is the subject of fundamental research. This information is also of great practical importance for solving the problem of asteroid hazard. In this paper, we describe the EOS problem of the substance of the surface of the Moon (regolith) and the asteroid matter (ordinary chondrite). We propose the method for constructing EOS for regolith and chondrite for the high pressure region, discuss the EOS model and obtained results.