

Shock Compressibility of Iron Alloys Calculated in the Framework of Quantum-Statistical Models

Authors : Maxim A. Kadatskiy, Konstantin V. Khishchenko

Abstract : Iron alloys are widespread components in various types of structural materials which are exposed to intensive thermal and mechanical loads. Various quantum-statistical cell models with the approximation of self-consistent field can be used for the prediction of the behavior of these materials under extreme conditions. The application of these models is even more valid, the higher the temperature and the density of matter. Results of Hugoniot calculation for iron alloys in the framework of three quantum-statistical (the Thomas-Fermi, the Thomas-Fermi with quantum and exchange corrections and the Hartree-Fock-Slater) models are presented. Results of quantum-statistical calculations are compared with results from other reliable models and available experimental data. It is revealed a good agreement between results of calculation and experimental data for terra pascal pressures. Advantages and disadvantages of this approach are shown.

Keywords : alloy, Hugoniot, iron, terapascal pressure

Conference Title : ICSCCM 2017 : International Conference on Shock Compression of Condensed Matter

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2017