Modeling the thermodynamic properties of nickel in shock-wave processes using equations of state, with and without accounting for melting

Seredkin N.N.[1,@], **Boyarskikh K.A.**[1] **and Khishchenko K.V.**[1]

[1] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg˜2, Moscow, 125412, Russia

[@] nikser12@yandex.ru

In this work, equations of state for nickel are proposed, derived within the framework of various models — both accounting for and disregarding melting. These models are based on expressions for free energy as a function of volume and temperature. The resulting equations of state allow for the calculation of the thermodynamic properties of nickel at the high energy densities characteristic of shock-wave processes. The results of calculations of shock adiabats of nickel, carried out within the framework of models without taking into account melting [1,2] and taking into account [3], are compared with each other, as well as with data from various shock-wave experiments. The developed equations of state for nickel can be employed in the hydrodynamic modeling of processes occurring at high pressures and temperatures.

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