THERMODYNAMIC PROPERTIES OF ALLOYS BASED ON TUNGSTEN, NICKEL AND COPPER AT HIGH PRESSURES AND TEMPERATURES

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The work discusses the properties of alloys based on tungsten, nickel and copper. Equations of state for the studied materials and their components were obtained within the framework of simple models [1–4], which are represented by thermal equations of state, that is, in the form of a dependence of pressure on specific volume and temperature. In this work, the models are supplemented with a parameter that has the meaning of specific isochoric heat capacity. As a result, expressions are constructed that determine the dependence of the specific internal energy on the specific volume and temperature, consistent with the existing dependences for pressure. The equations of state for alloys were obtained by taking into account the additivity of such physical quantities as specific volume, internal energy and entropy.

Within the framework of the indicated thermodynamically complete forms of theoretical description of the properties of substances, phase diagrams are calculated, and a study of the shock-wave characteristics of alloys and components is carried out; based on a comparison of the calculation results with experimental data on shock compression and isentropic expansion, the areas of applicability of the developed equations of state were determined.

The results obtained can be used in numerical modeling of processes associated with achieving high energy densities, and due to the simplicity of the forms of theoretical description of thermodynamic properties, the time of numerical calculations is reduced—this is an important advantage.

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