HEAT CONDUCTION OF SOLUTIONS: SUPERHEATED AND UNSTABLE STATES

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The phenomenon of superheating attracts the attention of researchers in connection with the substantial extent of the region of superheated states on the phase diagram of substance. Its key features have found application in high-speed technical applications. At the same time, rigid limitations are imposed on the system with respect to the volume of the superheated substance and the time of observation of the superheated state.

The report is devoted to the study of the heat conduction of solutions under high-power heat release. Objects of study were solutions that were impulsively superheated with respect to the liquid-vapor or liquid-liquid equilibrium temperature at a given pressure. A separate series of experiments was performed under superheat with respect to the diffusion spinodal of the solution. Specificity of the study is due to the variety of types of phase diagrams, as well as the possibility of concentration supersaturation of the solution. The elucidation of the influence of the double metastability factor (and instability one), which has its own characteristic times, on the processes of heat transfer and spontaneous boiling-up of solutions with different degrees of compatibility of components is a priority task of the study. The range of the heating pulse length was chosen on the basis of a compromise between the achievement of a sufficient thickness of the heated layer and the guaranteed absence of macroscopic liquid-liquid phase separation and/or convection.

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