

Thermal and Caloric Properties of Inhomogeneous Systems under Gravity Near the Critical Point

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The interdependence of the correlation properties with the caloric and thermal characteristics of inhomogeneous substances under gravity near the critical point have been investigated on the basis of the fluctuation theory of phase transitions. Interconnection between the caloric and thermal equations of state for inhomogeneous substances under gravity have been obtained on the basis of the amplitude ratios determined for the order parameter, entropy, compressibility, heat capacity and volumetric expansion coefficient of the substance along the limiting critical directions, namely, the critical isochore, critical isotherm and the phase interface. These relationships give a possibility to convert the caloric properties of the system to the thermal properties and *vice versa*.

Non-monotonic field dependence of the caloric characteristic, namely, the heat capacity, with the maximum not on the critical isochore, but at the non-critical densities of the system has been revealed in the supercritical temperature range. At the same time, the field dependence of the thermal characteristic, the compressibility, is monotonic. Field dependencies of both the compressibility and the heat capacity are monotonic at temperatures lower than the critical.