The thermophysical properties of low-temperature indium plasma

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The investigations of various thermophysical properties of a substance (thermodynamics and the electronic transport coefficients) are fulfilled for more than a century due to their importance for various fundamental tasks and applications. It gives rise to many new results especially in calculations which allow to shed light on these values in the region of low-temperature plasma (LTP), which for most of metals is located at the temperatures T = 10-100 kK [1–3]. However there are some metals which are purely studied under these conditions, especially at relatively low densities [4], including. indium. There are many measurements and calculations for liquid (at $T \leq T_m$ =430 K) and shock-compressed states at relatively high densities $\rho \sim \rho_n$ and $T \leq 10$ kK, where $\rho_n = 7.31$ g/cm^3 is the density at ambient conditions [5, 6]. For lower densities presently there are no any published measurements, excluding for semi-empirical equation of states (EOS), calibrated by measurements data under shock compression [6] and there are no data on the transport coefficients at all. Thus, it is necessary to fill this gap.

To do it we have modified previously developed model [4] to obtain the considered properties in LTP of In and have calculated them. The comparison with only available data of semi-empirical EOS [6] have shown good agreement within the area of applicability of present model.

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