

Calculation of ion structure factors in warm dense matter

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Recently, the interest in the study of various properties of warm dense matter, i.e. matter with kinetic energies of more than $0.2 eV$ and particle densities of more than $10^{25} m^{-3}$, strongly increased. Under such conditions, the transport coefficients of plasmas are strongly influenced by the ion distribution, i.e. by the ion-ion structure factor. The larger the ratio of the ion-ion potential energy to the ion kinetic energy Γ , the stronger the effect. On the other hand, it is believed that hypernetted chain (HNC) approximations and the mean spherical (MS) approximation are applicable for systems with large Γ . Thus, in the present work, electrical and heat conductivities of warm dense matter are calculated within Born approximation neglecting the ion-ion structure factor and considering it. For the ion-ion structure factor values are taken into account, which were observed in experiments or are calculated using HNC or MS approximations. It is found that the values of the electrical and heat

conductivities in plasmas at solid state density, calculated considering the ion-ion structure factor, are about 20 times larger than the values obtained neglecting the structure factor.

References

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