Calculation of thermodynamic corrections from electronic exchange effects in Thomas–Fermi model employed for hot dense plasma

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Abstract
In this paper, considering the plasma electronic exchange interaction effects, first, Thomas–Fermi equation has been solved numerically. Then, employing the results of these equations, the amount of exchange corrections for pressure and internal energy of the plasma (electron gas with specific atomic number) has been calculated based on variation of plasma density and temperature. The results of the calculations can be used in both quantitative and qualitative description of changing the phase of matter in high temperature and density, encountered with in theoretical and experimental studies of inertial fusion and astrophysical phenomena as well.

Keywords: hot dense plasma, equations of state, electronic exchange effects, Thomas–Fermi model, inertial confinement fusion

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