Some thermodynamic functions in asymmetric complex plasmas with regard to the nonlinear screening

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The authors consider a two-component equilibrium electroneutral system of classical macroions of finite size with the charge $Z \gg 1$ and point oppositely charged microions with a unit charge in the Poisson–Boltzmann approximation in an average spherically symmetric Wigner–Seitz cell [1]. All system microions approximate division into two types (free and bound ones) method based on taking into account the nonlinear screening effect is proposed. A significant decrease of the effective macroion charge Z^* compared to the initial macroion charge Z is noted due to a bound microions dense sphere in the macroion vicinity [2]. In this work, the all system particles interaction energy [3, 4] is calculated. The results are used by the authors to calculate the free energy and pressure in the average spherically symmetric Wigner–Seitz cell.

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