MACROION EFFECTIVE CHARGE IN HIGHLY ASYMMETRIC COMPLEX PLASMAS

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A classical two-component electroneutral equilibrium system of finite-sized macroions with a charge Z ($Z \gg 1$) and oppositely charged microions with a single charge is considered. Self-similar dependences of the macroion effective charge Z^* on the macroion initial charge Z, the system temperature, and the macroion radius are obtained for fixed packing parameters in the framework of the Poisson-Boltzmann approximation in the average spherical Wigner–Seitz cell [1] and in the framework of the Poisson–Boltzmann plus hole approximation (i.e., with regard to the nonlinear screening effect inside the hole) (hereinafter, in the PBH approximation) [2]. All microions are subdivided into free and bound ones. The concept of the macroion effective charge is introduced and its decrease was shown in comparison with the macroion initial charge in the Poisson–Boltzmann approximation in the Wigner–Seitz cell [3] and in the PBH approximation both with an additional consideration of microions correlations [2]. The paper evaluates the possibility of a microions pseudo-liquid phase separation into more and less dense phases in the PBH approximation with the microions correlations consideration [2].

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