Electrostatic potential of phase boundaries in coulomb systems

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Remarkable features of any phase boundary in equilibrium Coulomb system, i.e. existence of electrostatic potential drop through this boundary, have been studied on the base of simplified Coulomb model [1] and calculations of phase coexistence in real plasmas via chemical picture [2]. In contrast to the other electrophysical quantity, work function, electrostatic potential of phase boundary is pure thermodynamic quantity. It depends on bulk properties of coexisting phases only and does not depend on properties of interface. The comparative diagram for temperature dependent interface potential for several realizations of fluid-fluid phase transitions is under discussion. The zero-temperature limit of this drop is an individual substance coefficient. On opposite, the drop tends to zero at critical point of phase coexistence. A special critical exponent can be defined to describe this behavior. All the features form a kind of electrostatic phase diagram for any phase transition in Coulomb system [1].

Existence of interphase potential in a Coulomb system indicates asymmetry in equilibrium properties of different charge species in coexisting phases. It is illustrated via electrostatic potential for melting and evaporation boundaries in modified one component plasma model /OCP on uniformly compressible background – OCP(~) [1]/ with varying charge of ions, $Z = 1 – 10$ [4]. These results are compared with recent calculations of M. Fisher et al. [3] for interphase potential of gas-liquid interface in charge asymmetric model of charged-hard-spheres for $Z(+):Z(–) = 2:1$ and 3:1.

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