PHASE TRANSITIONS IN LOCAL EOS APPROXIMATION AND ANOMALIES OF SPATIAL CHARGE PROFILES IN NON-UNIFORM PLASMA

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Impressive appearance of discontinuities in equilibrium spatial charge profiles in non-uniform Coulomb systems is under discussions in wide number of thermoelectrostatics problems. Such discontinuities are considered as peculiar micro-level manifestation of phase transitions and intrinsic macro-level non-ideality effects in local equation of state (EOS), which should be used for description of non-ideal ionic subsystem in frames of local-density (or ”pseudofluid”, or ”jellium” etc) approximation. Such discontinuities were discussed already by the authors for electronic subsystems. Special emphasis is made in present paper on the mentioned above non-ideality effects in non-uniform ionic subsystems, such as micro-ions profile within screening cloud around macro-ion in complex (dusty, colloid etc) plasmas, equilibrium charge profile in ionic traps or (and) in the neighborhood vicinity of ”charged wall” etc. Multiphase EOS for simplified ionic model of classical charged hard spheres on uniformly compressible electrostatic compensating background was constructed and several illustrative examples of discussed discontinuous ionic profiles were calculated.