

Phase transition-like anomalies in spatial distribution for strongly non-ideal ionic systems in traps

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Phase transition-like (PT-like) discontinuities in equilibrium spatial charge distributions of ions in non-uniform Coulomb systems is a common phenomenon in wide number of problems for equilibrium thermo-electrostatic profiles. It was shown [1-4] that such discontinuities are 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 “pseudo fluid”) approximation. Special emphasis is made in present paper on the mentioned above non-ideality effects in non-uniform ionic subsystems, such as equilibrium charge profile in ionic traps with different external (retaining) potentials. Multiphase EOS for simplified ionic model - classical Charged Hard Spheres (CHS) on uniformly compressible electrostatic background was constructed. Several examples of discussed phase transition-like discontinuous ionic profiles were calculated for three variants of the traps.

[1] Iosilevskiy I.L., High Temp. 23, 807 (1985) (arXiv:0901.3535)

[2] Iosilevskiy I.L. and Chigvintsev A.Yu. (1992) Phase transition in simplest plasma models, in “Physics of Non-Ideal Plasmas”, ed Ebeling W et al (Teubner Verlag) pp 87, (arXiv:physics/0612113)

[3] Chigvintsev A.Yu. and Iosilevskiy I.L. (2012) Contrib. Plasma Phys. 52, 22933 (arXiv:physics/0609059)

[4] Chigvintsev A.Yu., Iosilevskiy I.L., Zorina I.G., Noginova L.Yu., (2018) J. of Phys. Conf. Ser. 946, 012092.

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