

Elasticity of polydisperse Yukawa particles in two-dimensions

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The Yukawa potential (YP) is one of widely used approximation to describe the interaction between particles in the field of condensed matter to model colloidal suspensions [1]. Recently, the equilibrium properties and phase diagram of two-dimensional (2D) Yukawa systems (YS) have been investigated [2]. In present study, the elastic properties of a crystalline 2D YS with a size polydispersity of particles are determined by MC simulations. The particles, interacting through hard-core repulsive YP, form a triangular structure. Effects of the size polydispersity and the Debye screening length on the elastic properties of the system are studied. It is found that an increase of size polydispersity in the system leads to an increase of the bulk modulus and a decrease of the shear modulus. It is also observed that the elastic moduli increase with the density, and the growth rate depends largely on the screening length. A smaller screening length causes an accelerated increase of the elastic moduli with the density.

References:

- [1] A. P. Hynninen et. al. Phys. Rev. E **68**, 021407 (2003)
- [2] P. Hartmann et. al. Phys. Rev. E **72**, 026409 (2005).

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