

Many-Body Contact Repulsion of Soft Disks

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A spring-and-plaquette network model is used to analyze the repulsion between elastic disks in contact. It was found, in various 2D geometries, that as disks approach the incompressibility limit the manybody effects become dominant and the disk-disk interaction ceases to be pairwise additive [1]. Upon compression, the disks undergo a transition from the localized to the distributed deformation regime accompanied by a steep increase of energy consistent with the onset of a hard core. These results shed new light on the structures formed by deformable objects such as soft nanocolloids. The many-body effects discussed and the effective potentials determined may be important for realization of soft colloidal quasicrystalline structures [2].

[1] A. Siber and P. Zihlerl, Many-Body Contact Repulsion of Deformable Disks, Phys. Rev. Lett. 110, 214301 (2013).

[2] T. Dotera, T. Oshiro and P. Zihlerl, Mosaic two-lengthscale quasicrystals, Nature 506, 208 (2014).