Elastic properties of Yukawa crystals

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We study elastic properties of solid Coulomb and Yukawa systems both consisting of identically charged particles and multicomponent. Elastic moduli and effective shear modulus of body-centered cubic (bcc) and face-centered cubic (fcc) lattices are obtained from electrostatic energies of deformed crystals. While the effective breaking stress is calculated from the analysis of the phonon spectrum such crystals. For the bcc lattice our results are well consistent with previous calculations and simulations and improve them, while results for the fcc lattice are mostly new. We also briefly discuss the applications for modeling stellar oscillations and different processes in degenerate stars.