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Kinetic approach to the dynamics of strongly coupled inhomogeneous plasmas[1] HANNO KÄHLERT, GABOR J. KALMAN, Boston College, MICHAEL BONITZ, ITAP, Kiel University — Based on the BBGKY hierarchy and an extended STLS ansatz for the two-particle distribution function, we derive kinetic and fluid equations for strongly coupled inhomogeneous plasmas that take both strong coupling and thermal effects into account [1]. The kinetic equation is employed to study the collective modes in a uniform plasma. The fluid equations are used to study the temperature dependence of the breathing mode of confined dusty plasmas, where excellent agreement with molecular dynamics simulations is observed. In the limit of weak density inhomogeneities, they can be reduced to the equations of linearized elasticity theory. The bulk and shear moduli emerge directly from the theory as integrals over the pair correlation function, and previous results in the literature are recovered [2]. The theory should be useful to study the collective modes of confined strongly coupled plasmas, where large density variations make the application of methods that were developed for uniform systems impractical.

[1] H. Kählert, G. J. Kalman, and M. Bonitz, submitted
[2] D. H. E. Dubin and J. P. Schiffer, Phys. Rev. E **53**, 5249 (1996), R. Zwanzig and R. D. Mountain, J. Chem. Phys. **43**, 4464 (1965)

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