



Transport of magnetized two-dimensional Yukawa liquids

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Using Langevin dynamical simulations, stochastic transports of a two-dimensional (2D) dusty plasma liquid with a perpendicular magnetic field are studied. When the magnetic field is very strong, i.e., the ratio of the cyclotron and plasma frequencies for dust particles is around the order of unity, the motion of dust particles tends to be more superdiffusive. The vibrational density of states has only one dominant peak frequency, which can be expressed as a function of the cyclotron and plasma frequencies. As the magnetic field increases, the shear viscosity increases with the magnetic field when the Yukawa liquid is cold; however, when the Yukawa liquid is hot, the variation trend is reverse. It is also found that the statistics of particle motion with a strong magnetic field tend to deviate from the classical Maxwellian distribution.

References

- [1] Yan Feng*, J. Goree, Bin Liu, T. P. Intrator, and M. S. Murillo, Superdiffusion of two-dimensional Yukawa liquids due to a perpendicular magnetic field, PHYSICAL REVIEW E, Vol. 90, 013105 (2014)
- [2] Yan Feng*, W. Lin, and M. S. Murillo, Viscosity of two-dimensional strongly coupled dusty plasma modified by a perpendicular magnetic field, PHYSICAL REVIEW E, Vol. 96, 053208 (2017)
- [3] Q. Wang, K. Wang, and Yan Feng*, Behaviors of 2D liquid dusty plasmas under perpendicular magnetic fields, CONTRIBUTIONS TO PLASMA PHYSICS, DOI:10.1002/ctpp.201700097 (2017)