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**Mode coupling for waves in a single-layer dusty plasma crystal**

BIN LIU, JOHN GOREE, YAN FENG, Department of Physics and Astronomy, The University of Iowa — Mode coupling of waves in a dusty plasma was experimentally observed. Polymer microspheres ( $8\ \mu\text{m}$ ) were introduced into an rf plasma, where they became negatively charged and confined in a single layer. They self organized in a crystalline-like lattice. There are dispersion relations for longitudinal and transverse modes for in-plane motion, and a transverse mode for out-of-plane motion. Due to a negative bias on the lower electrode, ions flow by each particle, and they are focused so that the wake downstream of each particle has a net positive space charge. This space charge, which moves along with the upstream particle, alters the interparticle interaction so that a vertical displacement of one particle results in an enhanced horizontal force on another particle. As a result, the wave dispersion relations are modified by the ion wake, especially where the two dispersion relations cross, in a phenomenon termed mode coupling. In an experiment, we observed mode coupling as well as some previously unpredicted modes, including one that we term the non-dispersive mode and a hybrid mode. This work was supported by NSF and NASA.

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