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Ground State and Collective Modes of Magnetic Dipoles Fixed on Two-Dimensional Lattice Sites JOHN FELDMANN, GABOR KALMAN, Department of Physics, Boston College, Chestnut Hill, 02467, USA, PETER HARTMANN, MTA-SZFKI, H-1525, Budapest, P.O. Box 49, Hungary, MARLENE ROSENBERG, Department of Electrical and Computer Engineering, University of California, San Diego, La Jolla, CA, 92093, USA — In complex (dusty) plasmas the grains may be endowed with intrinsic dipole moments. We present here our results of theoretical calculations[1] accompanied by and Molecular Dynamics simulation findings on the ground state configuration and on the collective modes mode spectrum of a system of magnetic dipoles, interacting via the magnetic dipole pair-dipole potential, fixed on two-dimensional (2D) lattice sites. In particular, we We study a family of lattices that can be characterized by two parameters: (parallelogram)—the aspect ratio, c/a, and the rhombic angle, phi. The The new collective modes of in the system associated with the dipole-dipole interaction are the angular oscillations (or wobbling) of the direction of the dipoles about their equilibrium configurations. We identify in-plane and out-of-plane modes and display their dispersions. Orders of magnitudes of the parameters of the system relevant to possible future experiments will be discussed.

[1]J D Feldmann, G J Kalman and M Rosenberg, J. Phys. A: Math. Gen. 39 (2006) 4549-4553

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