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Synchronization phenomena in systems with magnetodipolar interactions ANDREJS CEBERS, MIHAILS BELOVS, University of Latvia — Rich pattern formation phenomena under the action of AC field for two dimensional systems of magnetic dipoles floating on the surface of liquid are observed and reproduced numerically by the first-principles model [1]. Here by the study of dynamics of two dipoles interacting with weak dipolar forces it is found that due to series of bifurcations the motion of dipoles in AC field is synchronized. If the dipoles orientation is confined to the plane the synchronous oscillation regime by infinite period bifurcation transforms to the regime of synchronous rotation. This regime is unstable for intermediate values of the field strength and the motion of dipoles is periodic or quasi-periodic. Above the critical value of field strength these regimes transform to rotational regime and the dipoles synchronously rotate in plane. Estimate of the critical parameters of the synchronization according to the dimensionless parameters used in the first-principles model [1] show that the synchronization of the dipoles rotation should be inherent in this model.

[1] M.Belkin, A.Glatz, A.Snezhko, and I.S.Aranson, Phys.Rev.E, 82, 051301(R), (2010)

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