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Self-Assembly of Paramagnetic Beads in Rotating Magnetic Fields[1] ERIC KEAVENY, Division of Applied Mathematics, Brown University, MARTIN MAXEY, Division of Applied Mathematics, Brown University — Paramagnetic beads, about 1 μm in diameter, suspended in a liquid will aggregate to form chains when an initially random dispersion is subject to a uniform, static magnetic field. In a rotating field, the chains deform and, depending on the rotation rate, form S-shaped chains or aggregate clusters. A correct determination of the final shape requires an accurate calculation of the interparticle forces. We developed new methods to efficiently and accurately calculate the far-field and near-field magnetic interactions. Hydrodynamic interactions are resolved through the force-coupling method. We study the dynamics of single chains and suspensions of beads in rotating fields using these models and compare results from our simulations with recent experiments by Melle et. al. (Phys. Rev. E **68**, 041503). At high rotations rates, the observed particle oscillations provide information on the particle properties affecting near-contact hydrodynamic forces.

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