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Paramagnetic colloids in rotating fields: from chains through chaos to clusters.[1] HAMED ABDI, RASAM SOHEILIAN, RANDALL ERB, CRAIG MALONEY, Northeastern — We present computer simulations and experiments on dilute suspensions of superparamagnetic particles subject to rotating magnetic fields. We focus on short chains of particles and their decay routes to stable structures. At low rate, the chains track the external field. At intermediate rate, the short chains break up but perform a periodic (albeit complex) motion. At sufficiently high rates, the chains generally undergo chaotic motion at short times and decay to either close-packed clusters or more dispersed colloidal "molecules" at long times. We show that the transition out of the chaotic states follows a first order reaction kinetics.

[1]NSF

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