Abstract Submitted
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Analytic Solutions and Numerical Simulation of Self-Assemble Magnetic Colloidal Structures[1] DAVID PIET, Northwesten University/Argonne National Laboratory, IGOR ARONSON, ALEX SNEZHKO, Argonne National Laboratory, ATHUR STRAUBE, Humboldt University of Berlin — Self-assembled magnetic colloidal structures that lie at a fluid-air interface can have a wide range of behavior, from localized axisymmetric star-like objects to linear, snake-like ones. Modeling these structures requires both the extensive use of the Navier-Stokes Equations from an analytic standpoint as well as the ability to numerically solve and simulate them alongside Newton's Equations. Analytically, these equations are approximated by an asymptotic expansion with a small viscosity. Using those expressions, simulations are run on GPU's to utilize their parallel capability. The result is a remarkable, qualitative recapturing of the experimentally observed behavior, namely, the formation of both snakes and stars from a randomized initial condition.

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