Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Assembly and control of self-propelled structures in driven suspensions of magnetic microparticles. MAXIM BELKIN, Illinois Institute of Technology / Argonne National Lab, ALEXEY SNEZHKO, IGOR ARANSON, WAI-KWONG KWOK, Argonne National Lab — Magnetic microparticles suspended on the surface of liquid and subjected to periodic vertical magnetic excitations form a non-trivial dynamic snake-like pattern accompanied by large-scale surface flows. Apparently, controlled suppression of vortices at one end of the snake may lead to a formation of a self-propelled structure. We demonstrate that the suppression of the vortex pair can be implemented by the mechanical disturbance of the one end of the structure by means of the floating particle with characteristic size comparable to the width of the snake's segment. The snake structure with the particle attached to its end becomes a swimmer with parameters effectively controlled by the external driving magnetic field. Experimental studies of such self-propelled structures are presented.

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Date submitted: 27 Nov 2007 Electronic form version 1.4