# SURFACE WAVE ASSISTED ASSEMBLY OF DYNAMIC MULTI-SEGMENT MAGNETIC STRUCTURES IN AN ENSEMBLE OF MAGNETIC MICROPARTICLES SUSPENDED ON THE FLUID INTERFACE

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A new type of dynamic snake-like magnetic self-assembled structures induced in an ensemble of magnetic spherical particles at the surface of water by an alternating magnetic field is reported.

We demonstrate that these structures are directly related to surface waves in the liquid generated by the collective response of magnetic microparticles to the alternating magnetic field. A large-scale vortex flows are generated in the vicinity of the generated structure. The flow can be as fast as 2cm/sec and depends on the magnetic field parameters.

The segments of magnetic "snake" exhibit long-range antiferromagnetic ordering mediated by the surface waves, while each segment is composed of ferromagnetically aligned chains of microparticles. The structures exhibit magnetic hysteretic bahavior with respect to an external in-plane magnetic field and logarithmic relaxation of the remanent magnetic moment. To describe observed magnetic behavior of the generated structures we propose a simple phenomenological model where the effect of surface waves is replaced by an effective exchange interaction. In the framework of the proposed model the effective exchange constants corresponding to different regimes of magnetic driving were extracted from the experimental data.

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