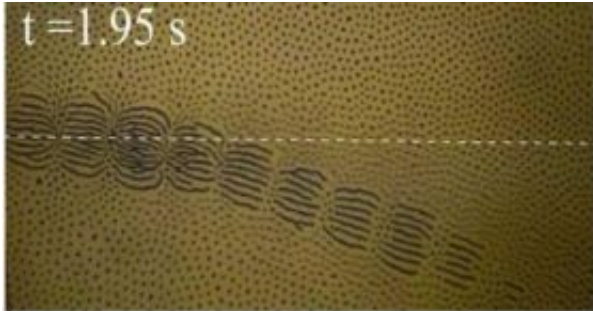


Magnetic Snakes Create Water Current

September 24 2007



Alternating magnetic fields create snake-like chains of magnetic particles suspended in fluid. The snakes direct the flow of the surrounding fluid along their lengths, potentially leading to new methods to control fluids in chip-based chemical analysis. Credit: M. Belkin, A. Snezhko, I.S. Aranson, and W.-K. Kwok

Physicists at Argonne National Laboratory have found that magnetic particles suspended in water and subjected to an alternating magnetic field will form snake-shaped structures that can control the flow of the surrounding fluid.

Current incarnations of the magnetic snake are a few centimeters long, but the team envisions much smaller versions as pumps to manipulate liquids on microscopic scales or precursors for next-generation magnetic recording media in future computers. The team's recent experiment shows that the speed of the water flowing along the snake depends on how quickly the magnetic field alternates.

To make a magnetic snake, the team put a water-filled beaker at the center of a magnetic coil. In the water, they suspended magnetic nickel spheres a little smaller than one tenth of a millimeter in diameter. These particles reacted to an alternating magnetic field created by the coil. The nickel spheres aligned themselves head-to-tail with nearby particles as though they contained tiny bar magnets.

The movements of the particle chain made waves on the surface of the water, encouraging the formation of parallel chains and causing a segmented pattern. The self-assembly of the snakes can take anywhere from a fraction of a second to several minutes.

Citation: M. Belkin et al., *Physical Review Letters*, forthcoming article

Source: American Physical Society

Citation: Magnetic Snakes Create Water Current (2007, September 24) retrieved 27 April 2024 from <https://phys.org/news/2007-09-magnetic-snakes-current.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.