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Realization of the Najafi-Golestanian microswimmer MAXIME HUBERT, GALIEN GROSJEAN, University of Lige, GUILLAUME LAGUBEAU, Universidad de Santiago de Chile, NICOLAS VANDEWALLE, University of Lige, GRASP LAB, CESAM RESEARCH UNIT TEAM, DEPARTAMENTO DE FSICA TEAM — The development of artificial microswimmers, microscopic robots that swim in a fluid like sperm cells and motile bacteria, could cause a leap forward in various fields such as microfluidics, microsystems, or minimally invasive medicine. Nature provides plenty of examples of efficient microswimmers. However, a bottom-up approach, looking at the simplest ingredients needed to generate a microswimmer, can lead to a deeper understanding of the swimming problem. First described by Najafi and Golestanian¹, a paradigmatic microswimmer is the three-linked-spheres model, which follows a minimalist approach for propulsion by shape shifting. In this presentation, we describe the experimental realisation of this microswimmer using self-assembled ferromagnetic particle at an air-water interface, powered by an uniform oscillating magnetic field². A model, using two harmonic oscillators, reproduces the experimental findings. Because the model remains general, the same approach could be used to design a variety of efficient microswimmers.

¹A. Najafi and R. Golestanian, Phys. Rev. E 69, 062901 (2004)

²G. Grosjean, M. Hubert, G. Lagubeau, and N. Vandewalle, Phys. Rev. E 94, 021101(R)

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