Abstract Submitted for the DFD11 Meeting of The American Physical Society

**Propulsion of an undulating elastic filament on a free surface**<sup>1</sup> SOPHIE RAMANANARIVO, BENJAMIN THIRIA, RAMIRO GODOY-DIANA, PMMH UMR7636 CNRS; ESPCI ParisTech; UPMC; U. Diderot Paris 7 — Nature offers a lot of examples of swimmers that use body undulations to move forward, such as eels or sperm. This type of locomotion involves strong fluid-structure interactions regardless of the regime of Reynolds number considered. Here we study a flexible filament forced to oscillate by imposing a harmonic motion to one of its extremities (using magnetic interactions) and propelling itself at the surface of a water tank. This experiment serves as a canonical model for studying the interactions between an elastic structure undergoing complex deformations and the surrounding fluid. We characterized the nature of the wave travelling the filament (by measuring its amplitude, phase velocity and spatial damping), as well as its propulsive performance in the different regimes encountered.

<sup>1</sup>We acknowledge support from the French National Research Agency through project No. ANR-08-BLAN-0099

Ramiro Godoy-Diana PMMH UMR7636 CNRS; ESPCI ParisTech; UPMC; U. Diderot Paris 7

Date submitted: 12 Aug 2011

Electronic form version 1.4