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Tethered fleximags: a physical model for ciliary propulsion. OLIVIA DU ROURE, AVIN BABATAHERI, PATRICE JENFFER, MARC FERMIGIER, PMMH-ESPCI, CECILE GOUBAULT, Inodiag — Fleximags are linear colloidal structures made of micron-sized superparamagnetic particles. Permanent links between colloids are established through molecules grafted on the particles. The elasticity of the linker bestows a flexibility to the filament. The fleximags have already been used to make one of the first artificial microswimmers (Dreyfus et al. Nature 2005) resembling a spermatozoon. They can also be anchored to a glass substrate isolated or as arrays. Those arrays build up experimental models of the array of cilia on paramecium for studying physical aspects of the propulsion. Here we'll show our first studies concerning anchored flexiamgs submitted to time-dependent field. The actuation is controlled by three electromagnets and allowing all types of 3-D movements: (a)symmetric beating in a plane, rotation... We first study one single anchored fleximag when the field is rotating on a cone. Only a part of the filament is moving reflecting the competition between magnetic interactions, elasticity and viscosity. The length of this mobile fraction decreases with frequency. We also study the induced flow by PIV.

Marc Fermigier
PMMH-ESPCI

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