LadHyX Seminar – Sept 19, 10:45

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Amoeboid and autophoretic swimmers : dynamics and rheology

Microorganisms, such as bacteria, algae, or spermatozoa, are able to propel themselves forward thanks to flagella or cilia activity. By contrast, other organisms employ pronounced changes of the membrane shape to achieve propulsion, a prototypical example being the Eutreptiella gymnastica. Cells of the immune system as well as dictyostelium amoebas, traditionally believed to crawl on a substratum, can also swim in a similar way. This issue will be discussed and a variety of dynamics and rheological properties will be discussed. Confrontation with experiments (on T lymphocyte) will be presented. The second part will be dedicated to autophoretic swimmers. It is shown that the swimmer may move in a straight manner, but can also meander at short scale but its trajectory wraps into a circle at larger scale. The swimmer also shows a chaotic motion. The statistics of the trajectory is found to be of run and tumble-like nature at short enough time, and of diffusive nature at long time without any source of noise. These motions are shown to be generic in the sense that they are dictated by general symmetry properties.