

Hydrodynamics of micro swimmers

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Time : 10:00 ~ ~~11:30~~ 11:00

The end of the seminar has changed. ↑

Seminar room, 2nd floor, building D

We study the motion and the hydrodynamic flow field generated by micro swimmers such as self-propelled microorganisms. We model the micro swimmer as squirmer [1], which exhibit squirming motion, with an axisymmetric surface slip velocity. As a result, squirmer exhibit only translational motion and produce hydrodynamic flow field which is symmetric about its translational axis. Later, we introduce chiral asymmetries in the surface slip velocity [2]. We show that by changing the parameters of the surface slip, the swimming trajectory of the chiral squirmer can become helical and chiral asymmetries arise in the hydrodynamic flow patterns. Also, we study the swimming trajectories of pairs of chiral squirmers which interact hydrodynamically. This interaction can lead to attraction and repulsion and in some cases even to bound states where the chiral squirmers continue to rotate around each other. Our study could be relevant for the collective movements of ciliated microorganisms.

[1] M.J. Lighthill, On the squirming motion of nearly spherical deformable bodies through liquids at very small Reynolds numbers, *Comm.Pure. Appl. Math.* 5, 109 (1952).

[2] P.S. Burada and F. Jülicher, Hydrodynamics of chiral squirmers, to be submitted to PRL.