

OPTIMAL STROKES FOR MICROSWIMMERS

– talk –

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Swimming strategies at the microscopic scale involves different mechanisms than in the human scale. Indeed, the flow is dominated by the viscosity effects of the water and becomes reversible. This feature, known as the “scallop theorem” in that context needs to be circumvented when one wants to swim with strokes that produce a net motion of the swimmer.

The talk proposes to make a tour of recent works on this topic by the author and collaborators [1–6]. In particular, we show how the problem becomes a control problem linear in the control and without drift, while optimizing the strokes with respect to the mechanical energy spent by the swimmer gives rises to an optimal control problem with a natural quadratic cost.

Numerical methods used to find optimal strokes will be also presented as well as numerical results on a few different systems.

REFERENCES

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