

Mathematical modeling for low-Reynolds-number swimming

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Swimming in a fluid at microscopic scale has multiple links in several fields of science, from biology to soft matter physics and micro-robotics. Whether it be a flagellated being, such as sperm cells, or particles tumbling in a fluid, problems usually involve a complex balance of hydrodynamics, elasticity and internal activity. In this mini-symposium, various mathematical models of swimmers are presented, involving ODEs and/or PDEs. After a general introduction on the topic, talks will focus on understanding different behaviors swimmers can exhibit, through the systems of equations modeling either the entire being (looking at rapidly spinning particles, or flagellar beating patterns), or smaller-scale activation mechanisms.

Speakers are :

- François Alouges (Centre Borelli, ENS Paris-Saclay) : Swimming at low Reynolds number
- Jessie Levillain : Mathematical models for flagellar activation
- Irene Anello (SISSA, Trieste) : flagellar activation mechanisms : a non linear study
- Clément Moreau (LS2N, Nantes) : Multi-scale analysis and reduced models for low-Reynolds swimmers