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LOW REYNOLDS NUMBER FLOWS: FROM MICROSWIMMERS TO MICRODRONES

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ABSTRACT

Flows where the Reynolds number is of the order of 10^3 or lower are relevant to a wide range of fast-growing engineering applications such as, for example, lab-on-a-chip devices, miniature swimmers for drug delivery, micro aerial vehicles for environmental monitoring, etc. The simulations of such problems share common modelling aspects and numerical challenges. On the one hand, the diffusion of flow momentum, and thus vorticity, is significant compared to its convection. On the other hand, the momentum diffusivity links different length scales that must be resolved simultaneously, thus requiring high-fidelity solvers.

This minisymposium aims to offer a platform for dissemination of knowledge and for sharing of good practice in the fluid mechanics and the numerical modelling of low Reynolds number flows. Furthermore, it aims to gather researchers across different disciplines including biology, mathematics, physics, engineering, computational science and industry to foster cross-dissemination of ideas and transdisciplinary research.

The minisymposium will offer a forum for discussion on the most recent advances in low Reynolds number flows including, but not limited to, the locomotion of small biological swimmers and flyers (e.g. insects and plant seeds), bioinspired and biohybrid artificial microswimmers, self-propelled swimming microrobots, insect-sized micro aerial vehicles, as well as advanced discretisation techniques and reduced order models tailored for such applications.