Applied and Computational Mathematics Seminar

Title: A separated vortex ring underlies the flight of the Jinny Joe

Speaker: Cathal Cummins (Heriot-Watt University/Maxwell Institute)

Date: Mon 30th September 2019 at 1:00PM

Location: Seminar Room SCN 1.25

Abstract: Large (macro) bodies, such as whales and bumblebees, move about using thin membranes (fins and wings etc.). Very small (micro) bodies, such as spermatozoa, use slender filaments for movement. At the macroscale, locomotion is achieved by imparting momentum to the surrounding fluid. At the microscale, such a strategy would be foiled by large viscous drag forces; hence, locomotion is achieved by exploiting drag forces. At some lengthscale, there is a shift from using thin membranes to using hairs to move. In this talk, we will explore the hydrodynamic basis of locomotion in this 'mesoscale' realm, with the common dandelion fruit (Jinny Joe) as our tour guide.

References

* Cummins, C., Seale, M., Macente, A., Certini, D., Mastropaolo, E., Viola, I. M., Nakayama, N. (2018). A separated vortex ring underlies the flight of the dandelion. Nature, 562(7727), 414–418. https://doi.org/10.1038/s41586-018-0604-2

* Seale, M., Cummins, C., Viola, I. M., Mastropaolo, E., Nakayama, N. (2018). Design

principles of hair-like structures as biological machines. Journal of the Royal Society Interface, 15(142). https://doi.org/10.1098/rsif.2018.0206

* Cummins, C., Viola, I. M., Mastropaolo, E., Nakayama, N. (2017). The effect of permeability on the flow past permeable disks at low Reynolds numbers. Physics of Fluids, 29(9). https://doi.org/10.1063/1.5001342

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