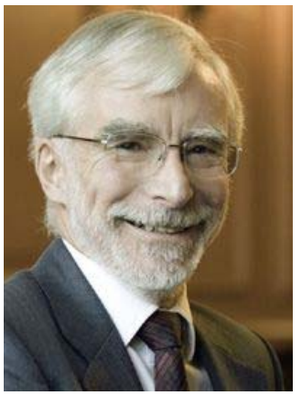
Institute Lecture



Micro-organism swimming: individual and collective behaviour

Prof. Timothy J Pedley, FRS
DAMTP, University of Cambridge

22th November 2016, Time: 5 PM, Venue: LH 8

Abstract

This talk will survey the fluid mechanics of micro-organism swimming, from the low Reynolds number locomotion of individuals (starting with the analyses of Taylor and Lighthill in the 1950s) to the not necessarily low Reynolds number flows that they collectively generate in suspensions. The survey for suspensions will start from studies of gyrotaxis in the 1990s, go on to the coherent structures driven by cell swimming stresslets, discovered in the 2000s, and conclude with the difficulties in developing a continuum model for relatively concentrated suspensions.

About the speaker

Prof. Timothy J Pedley is the G I Taylor Emeritus Professor of Fluid Mechanics at the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge. He obtained his BA, MA, and PhD (all in applied mathematics) from Cambridge. He has pioneered the application of fluid mechanics to understanding biological phenomena. His best-known work includes the study of blood flow in arteries, flow–structure interactions in elastic tubes, flow and pressure drop in the lung, and the collective behaviour of swimming microorganisms. His research has touched on issues of medical importance, including arterial bypass grafts, urine flow from kidneys to bladder, and the ventilation of premature infants. His work on microorganisms has application to plankton ecology.

Prof. Pedley has received many prestigious awards in his field, including the 2008 Gold Medal of the Institute of Mathematics and its Applications. In recognition of his research achievements, he was elected as the Fellow of Royal Society of London (1995), as the Foreign Associate of the US National Academy of Engineering in 1999, and subsequently Fellow of the American Institute for Medical and Biological Engineering, the American Physical Society, National Academy of Sciences, India, and Member of the Academia Europaea. He has served as Chair of the World Council of Biomechanics and President of the International Union of Theoretical and Applied Mechanics. Prof. Pedley has also served as the Editor-in-Chief of the reputed Journal of Fluid Mechanics. He is currently the C V Raman Professor (for the year 2016) of the Indian Academy of Sciences, Bangalore.

Tea at 4.45 PM

All interested are welcome.

Amalendu Chandra
Dean of Research and Development, IIT Kanpur