PhD Position: Collective dynamics in Active Biological Fluids

**Faculty/department** Mechanical, Maritime and Materials Engineering  
**Level** Master degree  
**Maximum employment** Maximum of 38 hours per week (1 FTE)  
**Duration of contract** 4 years

**Mechanical, Maritime and Materials Engineering**  
The 3mE Faculty trains committed engineering students, PhD candidates and post-doctoral researchers in groundbreaking scientific research in the fields of mechanical, maritime and materials engineering.

The Laboratory for Aero- and Hydrodynamics is a dynamic, highly multidisciplinary research laboratory that performs world-class research on the topics of turbulence, multiphase flow, microfluidics and biological flows. The research is carried out at a fundamental level using modern experimental and numerical methods.

**Job description**  
Collective motion is ubiquitous in the natural world; from the flocking dynamics of animal groups to the micron-scale swarm behavior of single-cell organisms, and the metachronal coordination of beating cilia. On these small scales, hydrodynamic forces are dominant and determine the motion of microswimmers, from single cells to swarms of millions of cells. This PhD project will investigate experimentally the interplay between hydrodynamics and cell motility. Our aim is to elucidate (1) the flow fields generated by collections of microswimmers and (2) the effect of controlled external flows and hydrodynamic interactions on the motility of microswimmers. This study will in turn provide insight into harnessing collective motion to generate flow, transport and micron-scale mixing, on the one hand, and using external flow to control and actuate biofluids on the other hand.

The PhD student will make use of multiple view microscopy and recently developed algorithm to perform micro-tomographic particle tracking to characterize both the motion of active microswimmers and the flow of the surrounding fluid seeded with passive tracer particles. External flows will be generated using microfluidic flow cells recently developed in the laboratory to control flow on the micron-scale.

**Requirements**  
Applicants should have  
• an excellent university Master’s degree in Applied Physics, Mechanical or Aeronautical Engineering or a related field;  
• strong background in continuum mechanics, experimental flow measurement techniques, or numerical methods and computer science;  
• high motivation to work on multidisciplinary research at the crossroads of fluid mechanics, physics, biology, and engineering;  
• independent, curiosity-driven work attitude;  
• excellent communication skills in English (written and spoken).
Conditions of employment
The TU Delft offers a customisable compensation package, a discount for health insurance and sport memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. An International Children’s Centre offers childcare and an international primary school. Dual Career Services offers support to accompanying partners. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities. As a PhD candidate you will be enrolled in the TU Delft Graduate School. The TU Delft Graduate School provides an inspiring research environment; an excellent team of supervisors, academic staff and a mentor; and a Doctoral Education Programme aimed at developing your transferable, discipline-related and research skills. Please visit http://graduateschool.tudelft.nl/ for more information.

Information and application
For more information about this position, please contact Dr. D.S.W. Tam, e-mail: d.s.w.tam@tudelft.nl. To apply, please e-mail a detailed curriculum vitae, a list of at least two academic references and full academic transcripts for your BSc and MSc, along with a letter of application by 1 July 2019 to D.S.W Tam, d.s.w.tam@tudelft.nl. Applications will be reviewed as they are received as we hope to fill the position as soon as possible. When applying for this position, please refer to "vacancy: Collective Dynamics in Active Biological Fluids"