MPIDS Colloquium

MAX-PLANCK-GESELLSCHAFT

Building towards bio-mechanical fluidic machines

Dr. Tyler Shendruk

Interdisciplinary Centre for Mathematical Modeling
Mathematical Sciences
Loughborough University, UK

While traditional fluids only flow when acted upon, a remarkable class of biomaterials can spontaneously flow by means of their own internal energy. These "active fluids" comprise a wide range of biological systems that bridge between biological and condensed matter systems due to being intrinsically driven out of equilibrium by internal energy injection from their microscopic elements, such as swimming bacteria or motor protein-microtubule bundles. The typically elongated nature of these active constituents frequently favors nematic alignment; however, their activity disturbs orientational order, continuously creating and annihilating pairs of topological defects. While these defects play a pivotal role in generating disorderly turbulent-like flows, they also have potential for engineering novel applications and understanding morphology when spatiotemporally ordered flow states can be produced.

This talk will describe the transitions between complex ordered flows produced by configurations of "dancing" defects and disorderly active turbulence within microchannels and rotary arrays. The knowledge gained from studying such "living" flows within confining and driven environments is essential for future designs of hybrid bio-mechanical devices that have the potential to work in conjunction with active biological fluids, rather than against them.

Wednesday, February 20th, 2018 at 2:15 pm

MPIDS, Prandtl lecture hall, building AI, Am Faßberg 11, Göttingen

Max Planck Institute for Dynamics and Self-Organization
Dynamics of complex fluids - Nonequilibrium soft matter group
Dr. Fabian Schwarzendahl
Email: fabian.schwarzendahl@ds.mpg.de, Phone: +49-(0)551/5176-247
Am Faßberg 17, 37077 Göttingen, Germany