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University of Miami, Physics Department Colloquium

Date: Wednesday, November 20th, 2024
Time: 4:30 pm – 5:00 pm
Location: Wilder Auditorium – Room 112, Knight Physics Building

Confinement induced vortex generation in ciliated marine larvae

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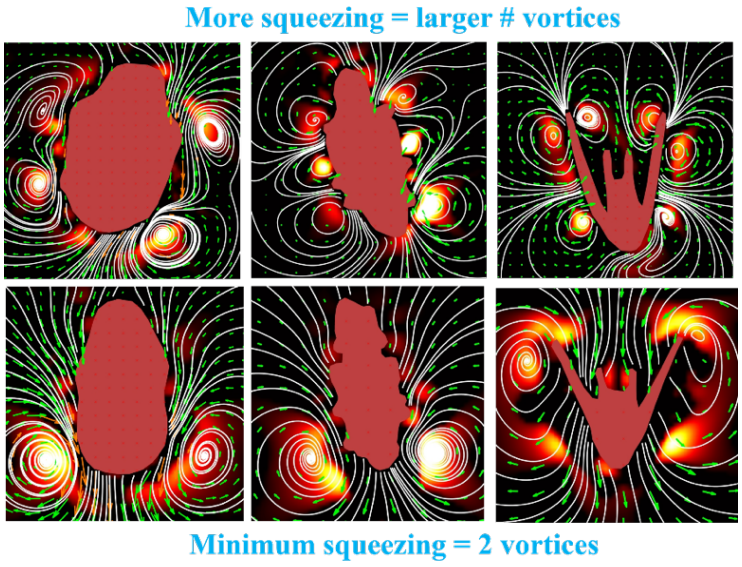
Abstract

Many ciliated marine invertebrate larvae swim and feed in a viscous low Reynolds number environment in the ocean. The larvae swim in three-dimensions (3D) using ciliary beating and their flow fields are often complex and challenging to quantify in experimental studies. The conventional microscopic imaging configuration of trapping larvae in between a glass slide and cover slip induces a quasi-two-dimensional (2D) confinement. We systematically quantify the fluid dynamical effects of this 2D squeeze-confinement on the flows generated by ciliated larvae at low Reynolds numbers (<0.5) with both spherical and non-spherical morphologies. We vary the confinement parameter, i.e. the gap between the glass slide and cover slip, and observe changes in the number of vortices, vortex size and intensity. In non-spherical larvae with complex morphology of sea stars and sea urchin, we find that increasing confinement leads to larger number of vortices that come closer to the body surface. Our results are broadly applicable for quantification of the fluid dynamical effects of squeeze confinement for ciliated larvae with a variety of morphologies.



Biography: Dr. Santhan Chandragiri is a postdoctoral researcher working with Prof. Vivek N. Prakash in the Department of Physics at the University of Miami. Dr. Chandragiri obtained his PhD in Chemical Engineering for his research on active fluid flows from the Indian Institute of Technology Madras (IITM), India. After his PhD, he started to work in the field of marine biophysics, specifically on experimental and theoretical biological fluid mechanics of ciliated marine larvae at the University of Miami. He is also interested in working on topics in soft matter such as the coffee ring effect.