Abstract Submitted
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Robokrill: understanding vortex generation during drag-based metachronal swimming[1] SARA OLIVEIRA SANTOS, University of California, Riverside, ANTONIO GOMEZ VALDEZ, OSCAR MORALES LOPEZ, FRANCISCO CUENCA-JIMENEZ, Universidad Nacional Autonoma de Mexico, VALENTINA DI SANTO, Stockholm University, MONICA M. WILHELMUS, University of California, Riverside — Metachronal, drag-based swimming in krill (sp. Euphausia superba) has been studied both to assess its ecological relevance as well as finding solutions for underwater locomotion at intermediate Reynolds numbers. While the use of submersible robots has proved useful to understand the benefits of metachrony and drag modulation as a means to propel forward, prominent questions regarding thrust generation remain unanswered. In this talk, we focus on fluid-structure interactions on the inner sections of the appendages of E. superba. We designed and constructed a scaled-up robotic model with geometric and kinematic similarity, reproducing the swimming kinematics of the appendages of free-swimming krill. Our robotic design allows the analysis of fine-scale kinematics and vortex generation in the vicinity of interior limb segments. We present Particle Image Velocimetry (PIV) measurements and flow dye visualizations using different limb shapes to investigate vortex formation mechanisms during drag-based propulsion. These findings feature important characteristics of metachronal propulsion that can be used in the development of underwater robots, especially in highly complex environments.

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