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Mechanical krill models for studying coordinated swimming ALICE MONTAGUE, HONG KUAN LAI, MILAD SAMAEE, ARVIND SANTHANAKRISHNAN, Oklahoma State University — The global biomass of Homo sapiens is about a third of the biomass of Euphausia superba, commonly known as the Antarctic krill. Krill participate in organized social behavior. Propulsive jets generated by individual krill in a school have been suggested to be important in providing hydrodynamic sensory cues. The importance of body positions and body angles on the wakes generated is challenging to study in free swimming krill. Our solution to study the flow fields of multiple krill was to develop mechanical krill robots. We designed krillbots using mostly 3D printed parts that are actuated by stepper motors. The krillbot limb lengths, angles, inter-limb spacing and pleopod stroke frequency were dynamically scaled using published data on free-swimming krill kinematics. The vertical and horizontal spacing between krillbots, as well as the body angle, are adjustable. In this study, we conducted particle image velocimetry (PIV) measurements with two tethered krillbots in a flow tank with no background flow. One krillbot was placed above and behind the other. Both krillbots were at a zero-degree body angle. Wake-body interactions visualized from PIV data will be presented.

Arvind Santhanakrishnan
Oklahoma State University

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