Technical track: Experimental Solid Mechanics

Dynamics and energetics in fish-like locomotion

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Fish and other aquatic animals come in a variety of shapes and sizes and have diverse swimming styles and speeds. For example, in a shark most of the motion is confined to the tail, whereas in the case of the eel a wave moves down its whole body as it swims forward. A distinctive character of these animals is their deformable shapes where the whole body motion is involved in producing the locomotion – the same body produces thrust and experiences drag. In contrast, in man-made underwater vehicles the only moving parts are the propeller blades with the propeller producing the thrust to overcome the drag on the generally rigid body. Some pertinent questions include are natural swimmers more efficient than man-made ones and what is a good measure of efficiency for such bodies. I will discuss the general principles related to the dynamics and energetics of self propelling bodies, and in more detail some of our recent work on clapping propulsion and self-propulsion of a simple pitching rigid foil.