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Control and Implementation of Highly Maneuverable Motions for Bioinspired Robotic Fish

Robotic fish, inspired by fish in nature, have drawn much attention in the last two decades. As an excellent research and experimental platform, robotic fish not only plays an important role in helping biologists to investigate the kinematic mechanism and hydrodynamic analyses, but also is employed by engineers to explore practical, effective and flexible propulsive mechanisms since natural fish have such surprised swimming skills characterized by high effectiveness, high maneuverability, and low noise. Since the first robotic fish, RoboTuna, was created at MIT in 1994, more and more robotic fish prototypes have been developed to explore the high efficiency and high maneuverability in fishlike swimming. In this talk, I will first introduce the main motion characteristics of real fish and summarize a general research technical route for the bioinspired robotic fish. Then, on the basis of our recent research achievements in biomimetic robotic fish and robotic dolphin, I will emphatically elaborate the analysis and control for high-efficiency and high-maneuverability motion of the robotic fish and robotic dolphin. Remarkably, dolphin flips and leaps which are first implemented by the physical robots will also be introduced.