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Swimming Inspired by Biology

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ABSTRACT:

Nature's swimmers have benefitted from over 500 million years of evolution to become fast, efficient, maneuverable, and stealthy. Through evolutionary pressure, swimmers have converged on a common set of features and behaviours entirely different from traditional human-made swimming machines. What secrets do they hold? We use theory, experiments, and computations to answer two questions: (1) What are the underlying physical mechanisms that have led nature's swimmers to converge on their observed features and behaviours? (2) How can we leverage the underlying physical mechanisms to engineer human-made swimmers that not only match, but outperform nature's swimmers? The second question points at an underappreciated fact: evolution has not necessarily optimized swimmers for swimming ability, and there is surely much room to engineer even better swimmers.

BIOGRAPHY:

Daniel Floryan is a postdoctoral research associate in the Department of Chemical and Biological Engineering at the University of Wisconsin-Madison, working with Mike Graham. He earned his Ph.D. in Mechanical and Aerospace Engineering from Princeton University in 2019, where he was advised by Clancy Rowley and Lex Smits, and undergraduate degrees in Mechanical Engineering and Economics from Cornell University in 2014. For his work on bioinspired propulsion, Daniel was awarded the Porter Ogden Jacobus Fellowship.