



UNIVERSITÀ DEGLI STUDI
DI TRENTO

Dipartimento di Ingegneria Civile,
Ambientale e Meccanica



Bio-inspired soft robotics for underwater propulsion

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Data	29 Agosto 2023
Orario	10:30-12:30
Aula	2R, DICAM, Mesiano

Underwater robotics is a complex and challenging field that offers an ideal context for testing new soft robotic technologies. Within the context of aquatic organisms, major sources of inspiration have been drawn from fish and cephalopods, but equally compelling to design bioinspired aquatic vehicles is the study of flagellated bacteria. Flagella are an interesting case study in soft robotics because they closely resemble, from a morphological and dynamics perspective, some of the archetypal continuum manipulators. This, along with the simplicity of their actuation and the richness of their dynamics makes them a valuable source of inspiration to design continuum, self-propelled underwater robots.

In this presentation, we will introduce a macro-scale aquatic soft robot inspired by flagellated prokaryotic bacteria. The robot's soft propeller design takes advantage of the compliance of its body to passively adjust its shape and generate stable helical waves that propel the robot forward. We will explore the relationship between geometry, actuation frequency, and material elasticity in optimizing the robot's thrust output. Finally, we will present experimental results demonstrating that the soft propeller is capable of efficient and agile propulsion in underwater environments.



Costanza Armanini received her B.Sc. and M.Sc. degrees in civil engineering from the University of Trento, Italy, in 2011 and 2014, respectively, and her Ph.D. degree in mechanical engineering from the same university in 2018. In 2019 she joined the Department of Mechanical Engineering at Khalifa University, Abu Dhabi, as a Postdoctoral Fellow. Starting September 2023, she is a Research Associate with the Center for Artificial Intelligence and Robotics at New York University, Abu Dhabi campus. Dr. Armanini's research interests focus on the modeling of bodies undergoing large deflections and the harnessing of the involved instabilities and nonlinearities for the development of novel technologies, with a special emphasis on soft robotics applications.

Tutti gli interessati sono invitati a partecipare.

Il seminario è organizzato dal Solid and Structural Mechanics Group

[D. Bigoni, F. Dal Corso, L. Deseri, D. Misseroni, M.F. Pantano, A. Piccolroaz, N. Pugno, R. Springhetti]