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SEMINARIO DI DIPARTIMENTO 17 E 18 MAGGIO 2022

Martedì 17 maggio 2022

ore 14:30 Sala di Consiglio

Simone Cacace (vincitore di una procedura selettiva per Professore associato nel SSD MAT08)

Seminario di Dipartimento

Titolo : Modeling and optimal control of a tentacle-like soft-manipulator.

Abstract:

Soft-robotics is an emerging branch of robotics, focused on the design, construction and control of articulated manipulators (even with a large number of degrees of freedom) composed of elastic and soft materials, able to perform complex tasks and to adapt to the working environment. The main objective, compared to more classical rigid manipulators, is to ensure the safety of human-machine interactions, especially in the industrial, but also in the medical field, with futuristic applications to invasive surgery and rehabilitation of patients with limited mobility.

In this seminar, I will present a mathematical model for a soft-robot inspired by an octopus tentacle, obtained using the theory of calculus of variations and studied through some tools of optimal control theory for partial differential equations. It is a two-dimensional model, which aims to capture the dynamics emerging from the biological structure of the tentacle. The reference theory is the Euler-Bernoulli beam, in particular its nonlinear formulation which includes an inextensibility constraint and a bending moment. To these properties a curvature constraint has been added, which prevents the tentacle from bending beyond a certain threshold, and also a distributed control term, which locally prescribes the curvature and models the voluntary contraction of the muscular system of the tentacle.

I will also present the results obtained by numerically solving some typical optimal control problems in this field: reaching a point with the free-end of the tentacle, avoiding obstacles in the working environment, and grasping objects, guaranteeing stability at the contact points with respect to external perturbations.

This is a joint work with A.C. Lai and P. Loreti at the Department of Basic and Applied Sciences for Engineering (SBAI), Sapienza University of Rome.

Martedì 17 maggio 2022

ore 12:00 Sala di Consiglio

Simone Cacace (vincitore di una procedura selettiva per Professore associato nel SSD MAT08)

Lezione (l'argomento sarà estratto a sorte 24 ore prima in Direzione, stanza 117).

Mercoledì 18 maggio 2022

ore 12:00 Sala di Consiglio

Vittoria Silvestri

Seminario di Dipartimento

Titolo: Modelli di crescita aleatoria sul piano

Abstract:

Lo studio dei meccanismi che regolano la formazione di strutture complesse in natura è da tempo oggetto di intensa ricerca in diverse aree della fisica e della matematica. In questo seminario presenterò diversi modelli di crescita aleatoria introdotti in tale ambito, sia discreti che continui, discutendone proprietà asintotiche come limiti di scala, fluttuazioni e mixing.

VEDI ANCHE

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