DManD
SUTD Digital Manufacturing and Design Centre

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

DManD Centre Seminar Series: Snapping and sliding rods

Date: 20 February 2018 (Tuesday)
Time: 1400 - 1500
Venue: Think Tank 11, 1.503

ABSTRACT

A summary of recent results obtained within the framework of structures subject to movable and configurational constraints is presented.

- A soft robot arm, loaded at one end with an hanging load, has the other end constrained by a slowly rotating clamp. Depending on the load amount, the behaviour of this system switches from an 'elastica compass' to an 'elastica catapult';
- A strip with controlled ends. Universal surfaces collecting the critical boundary conditions for which the structure display snap-back instability is disclosed;
- A rod constrained by a sliding sleeve ending with a linear spring may display self-restabilization. In this case, at increasing load, the deflection initially increases and then progressively decreases until the rod is totally inserted into the sliding sleeve;
- A rod subject to transversal forces (twist or bending) and frictionless constraints generates a longitudinal propulsive force realizing (torsional or flexural) locomotion. This motion occurs by tranforming elastic energy in kinetic energy.

The presented structural systems are modelled as nonlinear elastic structures and solved analytically. Physical models have been designed, realized and tested, confirming the theoretical predictions.
The results represent innovative concepts ready to be used in advanced applications, as for example in soft-robotics and locomotion.

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ABOUT THE SPEAKER

Francesco Dal Corso is Assistant Professor of Solid and Structural Mechanics at Department of Civil, Environmental and Mechanical Engineering of the University of Trento, Italy. His research activity is devoted to the Mechanical behaviour of Solid and Structures. In particular, he dealt with problems related to the localization of deformation, plasticity, large deformations, homogenization, higher-order continua, stress concentrations and singularities, contact mechanics, configurational mechanics and stability. francesco.dalcorso@unitn.it