

Séminaire

Mardi 28 avril 2026 à 10h30
Amphithéâtre Henri Benoît

Edoardo Milana

IMTEK Freiburg Center for Interactive Materials and
Bioinspired Technologies, University of Freiburg, Allemagne

Mechanical Nonlinearities as Physical Controllers for Soft Machines

Soft machines take advantage of their compliance to transmit motion and perform mechanical work through a monolithic design, without the need for assembling multiple rigid parts. However, when it comes to motion control, this compliance presents challenges, as control algorithms become increasingly complex in nonlinear systems. Nevertheless, embracing the nonlinear compliance of soft machines enables the replacement of software-based control with physical control, where not only the machine but also the controller is composed of soft mechanisms. In particular, nonlinear mechanical phenomena that lead to reversible elastic instabilities (e.g., buckling, snapping, kinking, ballooning, etc.) serve as excellent building blocks for designing simple physical controllers capable of generating low-level, self-regulating behaviors. These physical controllers can produce oscillatory patterns to enable soft robots to walk, encode actuation sequences for playing a piano, or close reactive sensorimotor loops that trigger state changes.

Les personnes souhaitant rencontrer l'orateur sont priées de prendre contact avec Aurélie Hourlier-Fargette.