DANISH CENTER FOR APPLIED MATHEMATICS AND MECHANICS

The 2025 DCAMM Annual Seminar Speaker

Katia Bertoldi

Professor,
Harvard John A. Paulson School of Engineering & Applied Science
Harvard University, USA

gives the following lecture at the

Technical University of Denmark

Meeting Room S09, Building 101, Kgs. Lyngby

The power of buckling: How instabilities enable smart, adaptive shells

Tuesday, December 16, at 14:00

There will be an open discussion after the lecture
at 15:00
(Refreshments are served)

This lecture aims at popularizing mechanical science to a broad audience of interested students and staff as well as engineers working in industry

The Danish Centre for Applied Mathematics and Mechanics, DCAMM, is a framework for internationally oriented scientific collaboration between staff members at a number of departments at the Technical University of Denmark, Aalborg University, Aarhus University and University of Southern Denmark. The "DCAMM Annual Seminar Speaker" is an initiative created to disseminate mechanics to a broader audience.
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Abstract

Elastic shells are ubiquitous in engineering and natural systems, spanning different scales. It's widely recognized that their behavior is highly nonlinear and they are prone to a significant loss in their load-bearing capacity when they undergo buckling. Shell buckling emerged as one of the most challenging nonlinear problems in mechanics more than seventy years ago when it was intensively studied. Today, it resurfaces with renewed significance, driven not only by structural applications but also by advancements in the life sciences and soft materials. Here, we embrace the concepts of large deformations, instabilities, and multistability as avenues to enhance the functionality of shells. I will demonstrate how instabilities can be harnessed to induce intricate and reprogrammable deformations in shells, showcasing their potential utility in soft robotics and wearables.