SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS1034 3 June 2026

A DCAMM seminar No. 808 will be presented by

Professor David Elata
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The title of the lecture is

Mechanical springs, electrostatic anti-springs, and MEMS parametric resonators

Abstract:

Electrostatic MEMS resonators combine the high quality factor attainable in vibrating microstructures, with the flexibility of electrostatic driving and sensing. Electrostatic resonators have been developed for signal filtering, clocking, and sensing applications, and since their introduction five decades ago, much effort has been invested to improve their performance.

The folded-beam suspension has been used as the spring of choice in many electrostatic comb-drive resonators for over 30 years It was assumed to respond as a linear spring, but this is actually true only for static states. Resonators vibrate harmonically, and in these conditions the response of the folded-beam suspension is nonlinear. I will present the dynamically balanced folded-beam suspension, in which this nonlinearity is avoided.

In recent years much attention is given to parametric resonators. We have used electrostatic anti-springs to implement a Meissner parametric resonator. I will present a model which gives a simple and intuitive explanation of parametric resonance, and I will show how it relates to the Meissner case. I will discuss two interesting features of the Meissner resonator: crossover points in the stability map, and the effect of damping at consecutive resonances of the 1 degree-of-freedom system.

DATE: **Wednesday, 17 June 2026**

TIME: **13:00 – 13:45**

PLACE: **Building 303B, room 134 (Mathematicum)**
DTU, Technical University of Denmark

Danish pastry, coffee and tea will be served 15 minutes before the seminar starts.

All interested persons are invited.

Mads Peter Sørensen/Jan Becker Høgsberg