



SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS1032

2 June 2026

A DCAMM seminar No. 806 will be presented by

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The title of the lecture is

Dzhanibekov-like transitions in several classic nonlinear pendulums

Abstract:

The Dzhanibekov effect, also known as the tennis racket effect or the intermediate axis theorem, relates to the instability of free rotation of a solid body around its intermediate axis of inertia. When a solid body is set to freely spin around its intermediate axis, it will repeatedly wobble and flip its orientation in space while maintaining its angular momentum.

Similar Dzhanibekov-like transitions have been recently identified in the elastic pendulum, in the double-pendulum and in the anisotropic pendulum. It is shown that Dzhanibekov-like transitions occur in the anisotropic pendulum only when the energy in the system is sufficiently large, such that the high frequency swing becomes the primary periodic motion with the intermediate frequency. In this sense it appears as if this effect is a generalization of the intermediate axis theorem, even though motion of the anisotropic pendulum does not maintain axial or angular momentum. Experimental evidence supporting our findings will be presented.

Finally, the conditions for autoparametric resonance of the elastic pendulum are analyzed. It is suggested that autoparametric resonance occurs only when the energy in the system is sufficient for the occurrence of a third primary periodic motion, which renders radial vibrations to have the intermediate frequency. This analysis is also supported by experimental evidence.

DATE:	Monday, 15 June 2026
TIME:	13:00 – 13:45
PLACE:	Building 303B, room 134 (Matematicum) 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

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