



Lectures on Dynamics



Aline Souza de Paula

University of Brasília (UnB, Brazil)
Department of Mechanical Engineering

Professor Souza de Paula is a faculty member of the Department of Mechanical Engineering at the Faculty of Technology of the University of Brasília (UnB, Brazil), where she serves as Coordinator of the Master's and PhD Programs in Mechanical Sciences. She has been and continues to be Principal Investigator of several competitively funded research projects. Her research activity, broad and internationally recognized, focuses on structural dynamics, smart materials mechanics—including metamaterials, piezoelectric materials, and shape memory alloys for advanced structural applications—energy harvesting from vibrating structures, vibration control, and advanced numerical methods.



Nonlinear Dynamics, Chaos and Metamaterials: Advanced Vibration Control

This short course provides an integrated overview of nonlinear vibration phenomena and modern strategies for vibration mitigation in mechanical systems. The lectures introduce the fundamental concepts of nonlinear dynamics, including qualitative and quantitative tools for analyzing complex system behavior, and extend to chaos control techniques and advanced approaches based on mechanical metamaterials. Both discrete and continuous systems are addressed, covering linear and nonlinear regimes, with applications relevant to vibration reduction and dynamic performance enhancement in engineering systems.

Topics: nonlinear dynamics; equilibrium points and stability; Poincaré sections; bifurcation diagrams; chaotic behavior; Lyapunov exponents; basins of attraction; nonlinear normal modes; chaos control methods; vibration mitigation strategies; mechanical metamaterials; linear and nonlinear vibration control.

Lecture Schedule

Lecture #1: Fri, **06 February 2026** – 16:00

Lecture #2: Mon, **09 February 2026** – 16:00

Lecture #3: Wed, **11 February 2026** – 16:00

Lecture #4: Fri, **13 February 2026** – 16:00

Lecture #5: Mon, **16 February 2026** – 16:00



Lecture Location - Multimedia room (classroom 3), ground floor side B, bldg Civil Engineering. University of Rome Tor Vergata - via del Politecnico 1, 00133 Rome.

Reference contact: prof. Giuseppe Vairo – vairo@ing.uniroma2.it, +39 06 7259 7088