LMS Seminar

Physics-informed data-driven modeling for the mechanics of soils and structures

Konstantinos Karapiperis

Data-Driven Mechanics Laboratory, Department of Civil Engineering, EPFL

Date and Time: June 26, 2025 (2 – 3 pm)

Venue: Amphi 104 (Pole Meca)

Abstract

The synergy of physics and data science has furnished a new paradigm for science and engineering, with major implications in the field of mechanics. In this talk, I explore how the integration of principles of physics and thermodynamics with machine learning and, more broadly, data-driven techniques can advance the simulation of material behavior. Particular emphasis is placed on the mapping between material microstructure and its constitutive behavior, which may be leveraged both for forward simulation as well as inverse design. These developments help address challenging mechanics problems, from enabling rapid simulations of geohazards to enhancing the resilience of structural materials.

About the speaker

Kostas Karapiperis joined EPFL as an Assistant Professor of Civil Engineering in June 2024, and directs the Data-Driven Mechanics Laboratory (LMD). His research is focused on the intersection of mechanics of materials and data science, with applications ranging from geomechanics to structural mechanics. Prior to EPFL, he worked as a Postdoctoral Researcher and Lecturer at the Department of Mechanical and Process Engineering of ETH Zürich, supported by a Marie Skłodowska-Curie Fellowship. He received his PhD in Applied Mechanics and a Minor in Applied Mathematics from the California Institute of Technology (U.S.A), following his MSc in Civil Engineering from the University of California, Davis (U.S.A), and his BSc also in Civil Engineering from the National Technical University of Athens, Greece.

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