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Dipartimento di Ingegneria "Enzo Ferrari"





NOVEMBER 09-TH, 2026
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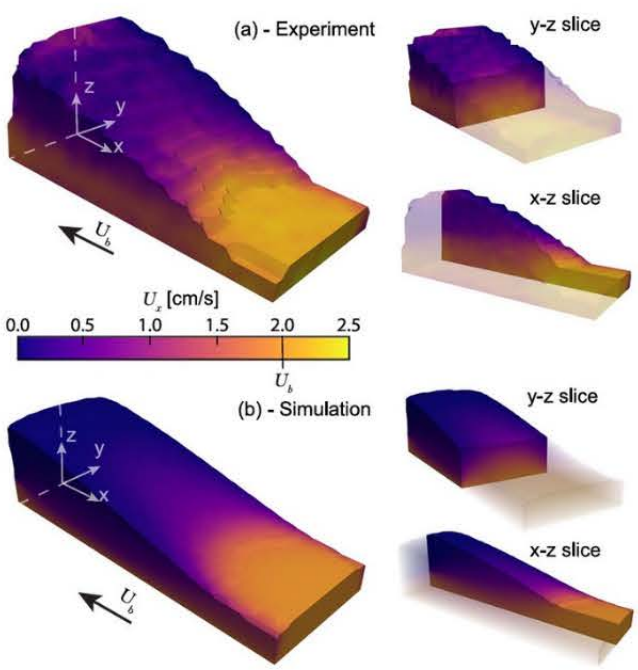
Seminar Announcement

Geomaterials-in-motion: from x-ray imaging to heterarchical dynamics

Prof. Itai Einav
The University of Sydney
Australia

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Cross-validation of velocity fields from X-ray experiments and numerical simulations
Credit: Nature Communications (2026). DOI: 10.1016/j.chemosphere.2026.145036

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Geomaterials-in-motion: from x-ray imaging to heterarchical dynamics

KEYWORDS:

- Granular geomaterials
- Grains-in-motion
- Advanced X-ray imaging
- Heterarchical granular dynamics
- Multiscale modelling

Granular geomaterials underpin industries and scientific fields ranging from minerals processing and pharmaceutics to batteries and geophysics. Understanding their motion is essential to process performance and fundamental science. This talk presents two complementary advances in grains-in-motion research: X-ray techniques that reveal three-dimensional fabric dynamics in clays and bulk motion in granular systems, and heterarchical granular dynamics, a computational framework that models large particulate systems with arbitrary grain-size distributions, overcoming limitations of conventional discrete element methods. Together, these experimentally validated approaches quantify geomaterial dynamics across scales, supporting improved modelling, process design, and optimisation.

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Prof. Itai Einav

Bio Sketch

In 2005, he joined the University of Sydney as a Senior Lecturer and was promoted to Full Professor in 2012. While in Sydney, he has served as the Director of the Sydney Centre in Geomechanics and Mining Materials (SciGEM). His research is guided by a passion for bridging physics and engineering. This interdisciplinary focus has enabled him to make significant contributions across both domains while developing a versatile toolkit of theoretical, computational, and experimental methods. Building on this foundation, Itai has advanced research in areas such as geomechanics, granular physics, geophysics, solid and fluid mechanics, and minerals processing, as well as in interdisciplinary collaborations at the interface with the arts.

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