



University of Liverpool - Division of Civil Engineering

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Tuesday 28 July 2020 12.00 BST (13.00 CET)

TRACKING TIME IN CRUNCHY SOFT MEDIA

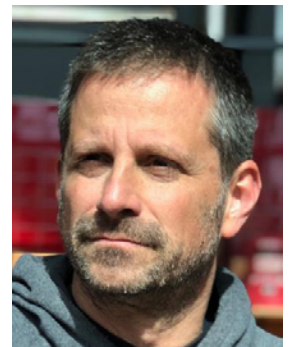
Professor Itai Einav, University of Sydney, Australia

ABSTRACT

It is commonly known that cereals crush under load or become soggy in fluid over time. But what happens when they are both loaded and soaked at the same time? Surprisingly, this experiment uncovers 'ricequakes' – the sudden collapses of columns of wetted brittle porous media that produce perpetual clicking sounds akin to a slowing metronome. To explain this phenomenon we present a simple model of capillary driven crushing steps progressing through the micro-pores. We show that the growth of ricequake delay over time is governed by the ratio between the typical size of micro-pores and the capillary-gravity length. Our model also explains the mechanisms that control the rate of deformation observed in the experiments. Finally, by relating fluid and solid properties to quakes and deformation, our results may be extended to other collapse problems wherein chemically active fluids weaken brittle porous media, such as failures of stockpiles, sinkholes, and ice shelves.

SPEAKER BIO

Itai Einav is working at the University of Sydney as a professor of geomechanics and Director of Sydney Centre in Geomechanics and Mining Materials (SciGEM). Itai's research focus is on the physics of granular materials including sand, dry snow, and rice bubbles. His current research encompasses the science of snap, crackle and pop in cereals, the granular origin of geotechnical offshore failures, and natural disasters such as earthquake faulting, landslides in soils, and avalanches in snow.
Motto: Inquisitio in gaudium.



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