

## EME International Seminar Series



# Stress theory for ideal and real granular materials

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### Abstract:

Jammed granular matter transmits stresses non-uniformly like no conventional solids, especially when it is on the verge of failure and immediately after yield. Jamming is caused by self-organization of granular matter under external loads, often giving rise to non-uniform load supporting networks, aka force chains. Isostaticity theory, which describes marginally rigid granular systems, is presented and justified. Its stress field equations, which are closed by stress-structure constitutive relations, are hyperbolic, in contrast to the elliptic nature of conventional strain-based elliptic theories, such as elasticity. It is this feature that leads to force chain solutions.

Recent extensions to isostaticity theory are presented, leading to exotic solutions, such as bending back forces in 2D. Progress towards 3D solutions will also be shown.

More recently, it has been proposed that real granular materials are made of mixtures of regions, some behaving elastically and some isostatically. The theory to describe these systems has been named stato-elasticity, and I will describe some progress in this direction.

Monday, 27 June 2022 17:00 – 18:30 (JST) 3E301 and Teams (hybrid) (Team code: : z2y60pz)