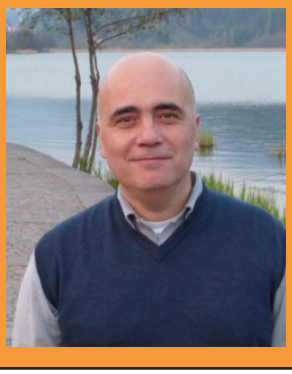
GALCIT Colloquium



Theory and Experiments are Strongly Connected in Nonlinear Mechanics

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A perturbative method is introduced to analyze shear band formation and development in ductile solids subject to large strain. Experiments on discrete systems made up of highly-deformable elements confirm the validity of the method and suggest that an elastic structure can be realized that buckles for dead, tensile loads. This structure has been calculated, realized and tested and provides the first example of an elastic structure buckling without elements subject to compression.

The perturbative method introduced for the analysis of shear bands can be successfully employed to investigate other material instabilities, such as for instance flutter in a frictional, continuum medium. In this context, an experiment on an elastic structure subject to a frictional contact shows for the first time that a follower load can be generated using dry friction and that this load can induce flutter instability.

The perturbative approach may be used to investigate the strain state near a dislocation nucleated in a metal subject to a high stress level. Eshelby forces, similar to those driving dislocations in solids, are analyzed on elastic structures designed to produce an energy release and therefore give evidence for configurational forces. These structures have been realized and they have shown unexpected behaviors, which opens new perspectives in the design of flexible mechanisms, like for instance, the realization of an elastic deformable scale.

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Lees-Kubota Lecture Hall

101 Guggenheim

Lecture followed by refreshments at 4 PM.

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