# Eventi all'Università della Svizzera italiana

**The folding and the faulting of an elastic continuum**

**The Faculty of Informatics is pleased to announce a seminar given by Davide Bigoni**

**DATE**: Wednesday, June 17th 2015
**PLACE**: USI Lugano Campus, room SI-008, Informatics building (Via G. Buffi 13)
**TIME**: 11.30

**ABSTRACT:**
Materials with extreme mechanical anisotropy are designed to work near a material instability threshold where they display stress channelling and strain localization, effects that can be exploited in several technologies. Extreme couple stress solids are introduced and systematically analyzed in terms of several material instability criteria: positive-definiteness of the strain energy (implying uniqueness of the mixed b.v.p.), strong ellipticity (implying uniqueness of the b.v.p. with prescribed kinematics on the whole boundary), plane wave propagation, ellipticity, and the emergence of discontinuity surfaces.

The Green's functions for applied concentrated force and moment are obtained for Cosserat elastic solids with extreme anisotropy, which can be tailored to bring the material in a state close to an instability threshold such as failure of ellipticity. It is shown that the wave propagation condition (and not ellipticity) governs the behavior of the Green's functions. These Green's functions are used as perturbing agents to demonstrate in an extreme material the emergence of localized (single and cross) stress channelling and the emergence of localized folding (or creasing, or weak elastostatic shock) and faulting (or elastostatic shock) of a Cosserat continuum, phenomena which remain excluded for a Cauchy elastic material. During folding some components of the displacement gradient suffer a finite jump, whereas during faulting the displacement itself displays a finite discontinuity.

**BIO:**
Professor Davide Bigoni is a mechanician working in material modeling (nonlinear elasticity, damage, elastoplasticity, visco- and thermo- plasticity, with applications to ceramic materials, granular media, composites, metals, and biomaterials), wave propagation in solids (with applications to metamaterials), fracture mechanics (with applications to porous media, and rock–like materials) and structural mechanics (with an emphasis on bifurcation and instability).

Currently Davide Bigoni holds a full professor position at the University of Trento, he has authored or co-authored more than 90 journal papers and has published a book. He was elected in 2009 Euromech Fellow (of the European Mechanics Society), has received in 2012 the Ceramic Technology Transfer Day Award (of the ACIMAC and ISTEC-CNR), and in 2014 he has received the Doctor Honoris Causa degree at the Ovidius University of Constanta. He is co-editor of the Journal of Mechanics of Materials and Structures, is associate Editor of Mechanics Research Communications and member of the editorial boards of: Archives of Mechanics, International Journal for Computational Methods in Engineering Science and Mechanics, Journal of Elasticity, Journal of the Mechanical Behavior of Materials, Acta Mechanica Sinica, and International Journal of Solids and Structures. He is reviewer for more than 90 international journals. He is vice chair of the panel PE8 for the European Research Council Starting Grants, panel member: for the Swiss National Science Foundation Starting Grants, for the Excellence Initiative funded by the Government of Spain, and for the Romanian National Council for Development and Innovation. He is reviewer for the Deutsche Forschungsgemeinschaft, for the EPSRC Research Grants (UK), for the Irish Research Council, for the Research Council of Norway, for the Technology Foundation STW of Netherlands, and for the Israel Science Foundation.

More details can be found at http://www.ing.unitn.it/~bigoni/

**HOST**: Prof. Rolf Krause