

IMT Institute for Advanced Studies Lucca

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Computational Fracture and Contact Mechanics

Part 1: Contact Mechanics

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Durata del corso: 10 ore

Contenuti del corso

This short course aims at providing an overview of numerical methods for modelling and solving contact problems between linear elastic bodies with smooth or rough boundaries.

The following topics are covered:

- Conforming and non-conforming contacts
- Boussinesq and Cerruti potentials
- A concentrated force on an elastic half-plane
- The theory of elastic contact by Hertz
- Mathematical modelling of surface roughness: the random process theory
- Numerical methods for the simulation of rough surfaces with fractal scaling
- A multi-resolution characterization of the topology of rough surfaces using a confocal profilometer
- Modelling of unilateral contact constraints in the finite element method: the method of Lagrange multipliers and the penalty method
- The node-to-segment contact strategy and its variants
- The boundary element method for the solution of contact problems with rough boundaries
- The real contact area
- The normal contact stiffness and mathematical analogies with the electric and the thermal contact conductances