HDM

HRVATSKO DRUŠTVO ZA MEHANIKU

ZAGREB – OSIJEK – RIJEKA – SL. BROD – SPLIT

Predavanje:

An Introduction to Computational Peridynamics

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Sažetak:

Peridynamics is a non-local extension of classical continuum mechanics that provides a framework for modelling material behaviour and failure in a way that accounts for long-range interactions between particles, rather than relying on traditional differential equations. Unlike classical models, which assume that forces between particles act only at infinitesimally small distances, Peridynamics introduces a finite interaction horizon, allowing for the modelling of cracks and discontinuities directly. This makes Peridynamics particularly useful in simulating the propagation of cracks, fracture processes, and the behaviour of materials under extreme conditions. The key element in Peridynamics is the concept of a bond, a connection between pairs of material points within a specified horizon. The bond-based formulation allows for capturing the effects of microstructure and damage accumulation. It has found applications in areas such as material science, structural engineering, and fracture mechanics. Peridynamics offers an alternative approach to traditional finite element methods, particularly in problems involving complex material behaviour, such as crack initiation and growth. Its ability to model discontinuities without needing special techniques for crack propagation makes it an attractive option for advancing the simulation of materials under stress and strain.

The three lectures will cover the foundation of Peridynamics and the main contributions to the state of the art of the Aerospace Structures Group of Padua university with final remarks on applications to computer aided surgery.