



4th Piola Lecture

PhD Program in Design, Modeling, and Simulation in Engineering

Integration of Geometry and Analysis Re-designed: The Power of Immersed Boundary Methods

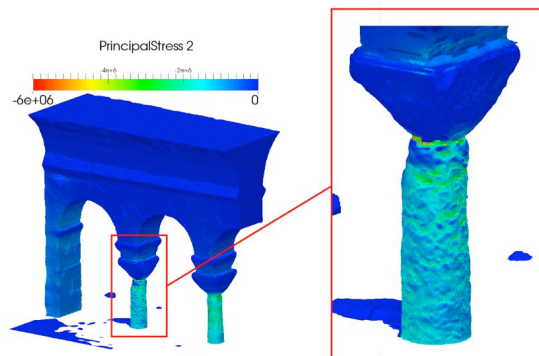
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Abstract

Immersing a structure in a larger body is a standard operation (typically associated with the term ‘trimming’) in geometric modelling. Immersing a computational in a ‘fictitious domain’ was suggested already in the 1960ies to approximate boundary value problems. Yet only during the last decade, Immersed Boundary Methods (IBM) have been realized as an attractive possibility for closely integrating geometric modelling and numerical analysis.

This talk will begin with an introduction in the general principles of IBM and then concentrate on a specific variant, the Finite Cell Method, an efficient combination of IBM with Isogeometric Analysis and Higher Order Finite Element Methods. The coupling of numerical analysis to various types of geometric models including questions w.r.t. ‘dirty’ geometry will be discussed. We will address an analysis of ‘as-designed’ versus ‘as-built’ lattice structures produced by additive manufacturing, discuss non-linear fracture problems based on computer tomograms and present an example for a camera-to-analysis workflow, where a point cloud of an object is obtained from photos of a consumer camera and directly transferred to a three-dimensional structural analysis.



November 5th, 2021 – 2:30 pm (sharp)

Aula Foscolo, University of Pavia