UNIVERSITÀ DEGLI STUDI
DI TRENTO
Dipartimento di Ingegneria Civile,
Ambientale e Meccanica

Instabilities and nonlocal multiscale modelling of materials
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AVVISO DI SEMINARIO

Si comunica che **venerdì 02 ottobre 2015 a partire dalle ore 10.30**
si terrà presso l'aula **2D** (via Mesiano 77) il seguente seminario

An overview on Isogeometric Collocation, a novel, fast and accurate Computational Mechanics paradigm.

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Isogeometric analysis (IGA) was first introduced ten years ago with the main aim of bridging Computer Aided Design (CAD) and Finite Element Analysis (FEA). The basic IGA concept, based on the isoparametric paradigm, consisted of adopting the same basis functions (splines) used for geometry representations in CAD systems for the approximation of field variables. The original goal was a cost-saving simplification of the typically expensive mesh generation and refinement processes required by standard FEA. In addition, thanks to the high-regularity properties of its basis functions, IGA showed a better accuracy per-degree-of-freedom and an enhanced robustness with respect to standard FEA. Such a superior behavior was exploited in a number of applications ranging from solids and structures to fluids and fluid-structure interaction. Moreover, the newly available higher regularity opened also the door to geometrically flexible discretizations of higher-order partial differential equations in primal form. A well-known important issue of IGA is related to the development of efficient integration rules able to reduce the high array formation costs induced by standard Gaussian quadrature, in particular when higher-order approximations are employed. Ad-hoc quadrature rules were proposed by several authors, but the development of a general and effective solution for Galerkin-based IGA methods is still an open problem.
In an attempt to address the issue above taking full advantage of the special possibilities offered by IGA and in particular by the available higher regularity, isogeometric collocation (IGA-C) schemes have been recently proposed. The main idea of IGA-C consists of the discretization of the governing partial differential equations in strong form, within the isoparametric paradigm, reducing the number of evaluations needed for array formation to only one per degree of freedom. The aim is to optimize the computational cost still relying on IGA geometrical flexibility and accuracy. In general, IGA collocation features look particularly attractive when evaluation and formation costs are dominant, as in the case, e.g., of explicit structural dynamics. Detailed comparisons with both IGA and FEA Galerkin-based approaches were carried out, showing IGA-C advantages in terms of accuracy versus computational cost, in particular for higher-order approximation degrees. Since its introduction, many promising significant works on IGA-C were published in different fields, including, among others, phase-field modeling, nonlinear elasticity, as well as several interesting studies in the context of structural elements.
In this lecture, an introduction on IGA-C is given, along with an overview of the most important results so far obtained in this context.

Tutti gli interessati sono invitati a partecipare.

Il seminario è organizzato dal gruppo di Scienza delle Costruzioni
(D. Bigoni, L. Deseri, N.Pugno, M. Gei, A. Piccolroaz, F. Dal Corso, M.F. Pantano, R. Springhetti)

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