Università degli Studi di Pavia
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imati

SEMINAR

Isogeometric Analysis

Designs are encapsulated in Computer Aided Design (CAD) systems. Simulation is performed in Finite Element Analysis (FEA) systems. FEA requires the conversions of CAD descriptions to analysis-suitable formats leading to finite element meshes. The conversion process involves many steps, is tedious and labor intensive, and is the major bottleneck in the engineering design-through-analysis process, accounting for more than 80% of overall analysis time. This is a major impediment to the overall product development cycle.

Isogeometric Analysis was created to address this problem [1,2]. The key concept utilized in the technical approach is the development of a new paradigm for FEA, based on rich geometric descriptions originating in CAD, resulting in one geometric model that is suitable for both design and analysis. In the few years since its inception, Isogeometric Analysis has become a focus of research within both the fields of FEA and CAD and is rapidly becoming a mainstream analysis methodology and a new paradigm for geometric design. I will describe areas in which progress has been made in developing new and improved Computational Mechanics methodologies to efficiently solve vexing problems that have been at the very least difficult, if not impossible, within traditional FEA. I will also describe current areas of intense activity and areas where problems remain open, representing opportunities for future research.

References:

[1] T.J.R. Hughes, J.A. Cottrell, Y. Bazilevs, *Isogeometric Analysis: CAD, Finite Elements, NURBS, Exact Geometry and Mesh Refinement,* Computer Methods in Applied Mechanics and Engineering, 194, (2005) 4135-4195.
[2] J.A. Cottrell, T.J.R. Hughes, Y. Bazilevs, *Isogeometric Analysis: Toward Integration of CAD and FEA,* Wiley, 2009.

Prof. Thomas J.R. Hughes
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September 24, 11am (sharp)
Seminar Room @ IMATI – CNR
Via Ferrata, 1 – Pavia

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