

## ADVANCES AND STRUCTURAL APPLICATIONS OF ISOGEOMETRIC ANALYSIS

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### ABSTRACT

Isogeometric Analysis (IGA) is a successful simulation framework originally proposed by T.J.R. Hughes et al., in 2005, with the aim of bridging Computational Mechanics and Computer Aided Design. In addition to this, thanks to the high-regularity properties of its basis functions, IGA has shown a better accuracy per degree-of-freedom and an enhanced robustness with respect to standard finite elements in many contexts - ranging from solids and structures to fluids, as well as to different kinds of coupled problems – opening also the door for the approximation in primal form of higher-order partial differential equations.

After a concise introduction of the basic isogeometric concepts, this lecture aims at presenting some IGA recent advances with a special focus on interesting structural applications in several fields where the characteristics of IGA seem to be of great advantage. In particular, applications that will be discussed include the simulation of fluid-structure interaction in different situations, studies on the effect of mechanically-induced stresses on prostate cancer growth, thermo-mechanical simulations of additive manufacturing processes, electro-mechanical simulations for biological tissues, and the use of phase-field modeling of fracture and other problems.