Innovative compatible discretization techniques for Partial Differential Equations

Informe

Información del proyecto

GEOPDES

Identificador del acuerdo de subvención: 205004

Proyecto cerrado

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Coordinado por
CONSIGLIO NAZIONALE DELLE RICERCHE
Italy

Este proyecto figura en...

Final Report Summary - GEOPDES (Innovative compatible discretization techniques for Partial Differential Equations)

IsoGeometric Analysis (IGA) is a novel technique for the discretization of partial differential equations. Th. J.R. Hughes and co-authors introduced it in 2005 and since then it has been having a growing impact on several scientific communities, from mechanical engineering, to geometric modeling and numerical analysis.

IGA methodologies are designed with the aim of improving the connection between numerical simulation of physical phenomena and the Computer Aided Design systems. Indeed, the ultimate goal is to eliminate or drastically reduce the approximation of the computational domain and the re-meshing by the use of the exact geometry directly within the simulation of the physical models. Besides this declared goal, the use of Splines and NURBS results in a successful idea in numerical analysis and paves the way to many new numerical schemes enjoying features that would be extremely hard to achieve within a standard finite element framework.
The GeoPDEs group has been a pioneer in the study and understanding of IGA and has succeeded in i) setting the mathematical basis for the understanding of IGA, ii) design spline elements able to solve equations beside the classical elliptic setting as electromagnetics and fluid mechanic systems, iii) provide the community with a free code that is easy to use and can be adopted as a platform to test new ideas and algorithms.
The results of our research are published as papers in the most renowned journals in numerical analysis and scientific computing, and are attracting the interests of engineers and practitioners in various fields.

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