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## Isogeometric Analysis: mathematical and implementational aspects, with applications

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**Abstract** Isogeometric analysis (IGA) is a recent and successful extension of the classical finite element analysis. IGA adopts smooth splines, NURBS and generalizations to approximate the problem unknowns, in order to simplify the interaction with computer aided geometric design (CAGD) where the same functions are used to parametrize the geometry of interest. Important features emerge from the use of smooth approximations of the unknown fields. IGA is a powerful high-order methodology for PDEs numerical solution, a careful implementation is adopted, which exploit its full potential. We present an overview of the mathematical properties of IGA, discuss computationally-efficient isogeometric and report some significant applications.

**Keywords:** Isogeometric analysis, splines, NURBS, multipatch, functional analysis, quadrature, PDE.

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