



## METADATA

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### Abstract

The purpose of this book is to briefly present the 'Method of Isogeometric Analysis' which is an extension of the well-known Finite Element Method mainly with the extensive use of NURBS. Since 2008, i.e. three years after the first appearance of the method, many European research projects have been implemented and some of them have resulted in open software which today constitutes material for the practice of students at the Master's level, internationally. Also, in recent years the concept of isogeometric analysis is slowly being adopted by specialized and/or general-purpose commercial software. Due to the nature of the subject of Isogeometric Analysis, both sufficient knowledge of CAD (Computer-Aided Design) and knowledge of the Finite Element Method (FEM) are required. Thus, the first five chapters of the book are dedicated to basic concepts of CAD theory and especially to the theory of describing curves, surface areas (patches) and the Cartesian product (tensor product) for the description of surfaces and structured

volumes (blocks). Without detailed mathematical proofs, special effort has been made to provide in each chapter the absolutely necessary knowledge for the practical application of Isogeometric Analysis, and not CAD per se. In Chapter 6, computer codes are listed for programming the procedures mentioned in Chapters 1 to 5. In Chapters 7-12, an extensive application of the Isogeometric Method is made in the solution of partial differential equations of all kinds, while in Chapter 13, a historical overview, which covers the beginnings up to the modern trends of the Isogeometric Method, is presented. Starting from one-dimensional problems, the primary concepts of the robustness matrix and the mass matrix are introduced. Second-order differential equations are covered, which concern both field problems (Heat transmission, sound propagation-Acoustics) and Static and Elastodynamic Analysis of Structures. Also, fourth-order equations are covered, which relate to the bending of beams and plates as well as thin shells.

