

1. Record Nr.	UNINA9910830848903321
Autore	Bouclier Robin
Titolo	Iga : non-conforming coupling and shape optimization of complex multipatch structures // Robin Bouclier and Thibaut Hirschler
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons, Inc., , [2022] ©2022
ISBN	1-119-98854-3 1-119-98855-1 1-119-98853-5
Descrizione fisica	1 online resource (254 pages)
Disciplina	620.1064
Soggetti	Multiphase flow Adaptive signal processing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Cover -- Half-Title Page -- Title Page -- Copyright Page -- Contents -- Preface -- Chapter 1. Introduction to IGA: Key Ingredients for the Analysis and Optimization of Complex Structures -- 1.1. Brief introduction -- 1.2. Geometric modeling and simulation with splines -- 1.2.1. Parametric representation of geometries -- 1.2.2. B-spline and NURBS technologies -- 1.2.3. Design features and shape parameterization -- 1.2.4. Spline-based finite element analysis: isogeometric principle -- 1.3. Improved CAD-CAE integration for robust optimization -- 1.3.1. Returning to the original motivations behind IGA -- 1.3.2. An ideal framework for parametric shape optimization -- 1.4. The analysis-suitable model issue -- 1.4.1. The trimming concept -- 1.4.2. Non-conforming multipatch parameterization -- 1.4.3. Imposing shape variation -- 1.5. Computation of non-conforming interfaces: a brief overview of usual weak coupling methods -- 1.5.1. Governing equations -- 1.5.2. Penalty coupling -- 1.5.3. Mortar coupling -- 1.5.4. Nitsche coupling -- Chapter 2. Non-invasive Coupling for Flexible Global/Local IGA -- 2.1. Brief introduction -- 2.2. The standard non-invasive strategy -- 2.2.1. Origin -- 2.2.2. Non-invasive resolution of the coupling problem --

2.3. Interest in the field of IGA -- 2.3.1. Global/local modeling in IGA
-- 2.3.2. Challenges -- 2.4. A robust algorithm for non-conforming
global/local IGA -- 2.4.1. Reference formulation: non-symmetric
Nitsche coupling -- 2.4.2. A Nitsche-based non-invasive algorithm --
2.4.3. Validation -- 2.5. Summary and discussion -- Chapter 3.
Domain Decomposition Solvers for Efficient Multipatch IGA -- 3.1.
Introduction -- 3.2. Benefiting from the additional Lagrange multiplier
field for multipatch analysis -- 3.3. Case of multipatch Kirchhoff-Love
shell analysis -- 3.3.1. Kirchhoff-Love shell formulation: basics.
3.3.2. Formulation of the coupled problem -- 3.3.3. Preliminary
results: monolithic resolution -- 3.4. On the construction of dual
domain decomposition solvers -- 3.4.1. Formulation of the interface
problem -- 3.4.2. Solving the interface problem -- 3.4.3. Null space
and pseudo-inverse -- 3.4.4. Preconditioning -- 3.5. Numerical
investigation of the developed algorithms -- 3.5.1. Standard solid
elasticity -- 3.5.2. Heterogeneous plate bending -- 3.5.3. Scordelis-Lo
roof -- 3.5.4. Stiffened panel -- 3.6. Summary and discussion --
Chapter 4. Isogeometric Shape Optimization of Multipatch and
Complex Structures -- 4.1. Introduction -- 4.2. Isogeometric shape
optimization framework -- 4.2.1. Optimization -- 4.2.2. Multilevel
design -- 4.2.3. Design variables -- 4.2.4. Formulation and resolution
-- 4.3. Unify the DD approach and multipatch optimization: towards
ultimate efficiency -- 4.3.1. DD computation of the response functions
-- 4.3.2. DD computation of the sensitivities -- 4.3.3. Non-design
parts -- 4.3.4. Fast re-analysis -- 4.3.5. Optimization algorithm --
4.4. Innovative design of multipatch structures: focus on aeronautical
stiffened panels -- 4.4.1. Geometric modeling: embedded entities --
4.4.2. Analysis: an embedded Kirchhoff-Love shell element -- 4.4.3.
Two preliminary examples to illustrate the design capabilities -- 4.5.
Application to solid structures and first interests -- 4.5.1. Simple
extension of the method -- 4.5.2. A test case in 2D -- 4.6. Advanced
numerical optimization examples -- 4.6.1. Global shell optimization:
stiffened roof -- 4.6.2. Local shell optimization: curved wall -- 4.6.3.
Designing an aircraft wing-box -- 4.7. Towards the optimal design of
structural details within isogeometric patches -- 4.7.1. A simple but
instructive test case.
4.7.2. Unify the non-invasive global/local approach and the
optimization of local details -- 4.7.3. Preliminary results and
perspectives -- 4.8. Summary and discussion -- References -- Index
-- Other titles from iSTE in Numerical Methods in Engineering -- EULA.
