Isogeometric Analysis For Topology Optimization With A Phase Field Model

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Isogeometric Analysis For Topology Optimization

We consider Isogeometric Analysis for the spatial approximation which facilitates encapsulating the exactness of the representation of the design domain in the topology optimization and is particularly suitable for the analysis of phase field problems. We demonstrate the validity of the approach and numerical approximation by solving two and three-dimensional topology optimization problems.

Isogeometric Analysis for Topology Optimization with a ...

An isogeometric analysis based topology optimization approach based on the popular SIMP model is developed to attack the challenging stress-constrained design problem. The STM-based stabilization schemes are also suggested to achieve stable convergence and desired topological designs of continuum structures in plane stress state and thin plates with bending stress constraint.

Isogeometric analysis based topology optimization design ...

This paper presents an isogeometric approach to topology optimization of spatially graded hierarchical structures, which are assumed to be consisted of identical or spatially varying substructures. In this work, the isogeometric analysis (IGA) is adopted for an efficient and accurate performance assessment of spatially graded structures, especially for those with complex geometries.

An isogeometric approach to topology optimization of ...

AbstractInthispaper,wepresentanaccurateandefficient isogeometric topology optimization method that integrates thenon-uniformrationalB-splinesbasedisogeometricanaly- sis and the parameterized level set method for minimal compliance problems.

Isogeometric analysis for parameterized LSM-based ...

Isogeometric analysis (IGA), proposed by Hughes and his co-workers [35,36], aims to keep the consistency between the Computer-Aided Design (CAD) model and the Computer-Aided Engineering (CAE) model, which has attracted many researchers recently [37,38]. An earlier work that introduced IGA into topology optimization, was performed in .

Isogeometric topology optimization for rational design of ...

The proposed method not only inherits the explicitness of the MMC-based topology optimization, but also embraces the merits of the Isogeometric Analysis (IGA) such as a tighter link with Computer-Aided Design (CAD) and higher-order continuity of the basis functions.

Explicit isogeometric topology optimization using moving ...

Isogeometric analysis 1 Introduction The presence of clearances in mechanical joints is practically inevitable due to manufacturing tolerances, wear and material deformation (Flores et al.,2008). Friction and impact forces present in a joint

clearance, mainly in absence of lubrication, contribute to increas-

An Isogeometric Analysis Approach to Kinematics of Spatial ...

Abstract We present an energy penalization method for isogeometric topology optimization using moving morphable components (ITO-MMC), propose an ITO-MMC with an additional bilateral or periodic symmetric constraint for symmetric structures, and then extend the proposed energy penalization method to an ITO-MMC with a symmetric constraint.

Isogeometric topology optimization based on energy ...

In this paper, an effective and efficient topology optimization method, termed as Isogeometric Topology Optimization (ITO), is proposed for systematic design of both 2D and 3D auxetic metamaterials based on isogeometric analysis (IGA).

Topology optimization for auxetic metamaterials based on ...

Based on isogeometric analysis, we use B-splines as the basis for both the design optimization and the flow analysis, thereby unifying the models for geometry and analysis, and, at the same time, facilitating a compact representation of complex geometries and smooth approximations of the flow fields.

Isogeometric shape optimization in ... - link.springer.com

Illusion thermotics, which aims at creating temperature fields to mislead a thermal detector, encompasses many thermal functionalities. It has attracted significant attention due to the increasing ...

Illusion thermotics with topology optimization

The paper introduces a novel multiresolution scheme to topology optimization in the framework of the isogeometric analysis. A new variable parameter space is added to implement multiresolution topology optimization based on the Solid Isotropic Material with Penalization approach.

Multiresolution topology optimization using isogeometric

...

This study focuses on the topology optimization of structures using a hybrid of level set method (LSM) incorporating sensitivity analysis and isogeometric analysis (IGA). First, the topology optimization problem is formulated using the LSM based on the shape gradient. The shape gradient easily handles boundary propagation with topological changes.

ISOGEOMETRIC TOPOLOGY OPTIMIZATION OF STRUCTURES USING ...

An improved isogeometric analysis method for trimmed geometries Jinlan Xu Ningning Sun Laixin Shu Timon Rabczuk Gang Xu School of Computer Science and Technology, Hangzhou Dianzi University, Hangzhou 310018, P.R.China Institute of Structural Mechanics, Bauhaus-University Weimar, Marienstr. 15, D-99423 Weimar, Germany

An improved isogeometric analysis method for trimmed ...

Abstract In this paper, we present an accurate and efficient isogeometric topology optimization method that integrates the non-uniform rational B-splines based isogeometric analysis and the parameterized level set method for minimal compliance problems.

Isogeometric analysis for parameterized LSM-based ...

Isogeometric Analysis IGA is a relatively new method that is a logical extension of the classical finite element method.

Computational Mechanics – Computational mechanics lab at ...

Jaxon, N. and Qian, X., ``Isogeometric analysis on triangulations,'' Computer-Aided Design, Special Issue on GD/SPM 2013: SIAM/ACM Joint Conference on Geometric and Physical Modeling, Vol. 46, pp. 45- 57, 2014 .

Computational Design, Isogeometric Analysis, Geometry ...

His technical contributions span several sub-fields, including geometric modeling, topology optimization, shape optimization

and isogeometric analysis. Current research activities include 1) design for additive manufacturing, 2) multi-physics topology and shape optimization, and 3) isogeometric analysis on triangulations.

Xiaoping's homepape

ABSTRACT In the present paper, an approach is proposed for structural topology optimization based on combination of Radial Basis Function (RBF) Level Set Method (LSM) with Isogeometric Analysis (IGA). The corresponding combined algorithm is detailed. First, in this approach, the discrete problem is formulated in Isogeometric Analysis framework.

COMPOSITION OF ISOGEOMETRIC ANALYSIS WITH LEVEL SET METHOD ...

Abstract We present an energy penalization method for isogeometric topology optimization using moving morphable components (ITO–MMC), propose an ITO–MMC with an additional bilateral or periodic symmetric constraint for symmetric structures, and then extend the proposed energy penalization method to an ITO–MMC with a symmetric constraint.