*ICCES, 2023, vol. 26, no.2*
DOI: 10.32604/icces.2023.09068

**PROCEEDINGS**

# An Automatic Post-Processing Procedure for Isogeometric Topology Optimization Results

**Yuhao Yang[1] and Yingjun Wang[1,*]**

[1] National Engineering Research Center of Novel Equipment for Polymer Processing, The Key Laboratory of Polymer Processing Engineering of the Ministry of Education, Guangdong Provincial Key Laboratory of Technique and Equipment for Macromolecular Advanced Manufacturing, South China University of Technology, Guangzhou 510641, China

[*]Corresponding Author: Yingjun Wang. Email: wangyj84@scut.edu.cn

**ABSTRACT**

In the intelligent structural optimization, designers can obtain a high-performance design scheme automatically with the help of topology optimization (TO). Since computer aided design (CAD) and computer aided engineering (CAE) models have different geometric representations in TO, the optimized results must be reconstructed to generate CAD models, which is complicated and time-consuming. To address this issue, the isogeometric analysis (IGA) is employed in TO to replace the finite element method (FEM), and such TO is termed as isogeometric TO (ITO). ITO is an advanced TO method with high efficiency and accuracy. It uses the same non-uniform rational B-spline (NURBS) basis function in both geometric representation and physical interpolation. However, due to the complex optimized structures, the automatic post-processing procedure for ITO is still challenging. To solve this problem,we present an automatic post-processing procedure to generate editable CAD models in terms of the control points of ITO. The procedure takes the design variables as high-dimensional coordinates of the control points, and reconstructs the CAD model automatically by a series of geometric algorithms such as surface/plane intersection algorithm, surface skinning, and plane trimming algorithm. Therefore, the result CAD models of the procedure are boundary representation consisting of skinned B-spline surfaces and trimmed planes. The proposed automatic post-processing procedure takes full advantage of ITO, and breaks the bottleneck of integrating structure design, analysis, and optimization.

**KEYWORDS**

Isogeometric topology optimization; model reconstruction; post-processing; surface/plane intersection

**Acknowledgement:** This work has been supported by the National Key R&D Program of China (2020YFB1708300) and National Natural Science Foundation of China (52075184). These supports are gratefully acknowledged.

**Funding Statement:** The author(s) received no specific funding for this study.

**Conflicts of Interest:** The authors declare that they have no conflicts of interest to report regarding the present study.