

DOING TOPOLOGY OPTIMIZATION EXPLICITLY AND GEOMETRICALLY BASED ON MOVING MORPHABLE COMPONENTS/VOIDS (MMC/MMV) APPROACH— SOME NEW DEVELOPMENTS

Xu Guo^{1,*}, Weisheng Zhang¹

¹ State Key Laboratory of Structural Analysis for Industrial Equipment,
Department of Engineering Mechanics,
International Research Center for Computational Mechanics,
Dalian University of Technology, Dalian, 116023, P.R. China,

* Corresponding author. Tel: +86 411 84707807; E-mail address: guoxu@dlut.edu.cn

Keywords: Topology optimization, Explicit and Geometrical, Moving Morphable Components (MMC)

Abstract

In the present talk, we intend to demonstrate how to do topology optimization in an explicit and geometrical way. To this end, a new computational framework for structural topology optimization based on the concept of moving morphable components/voids is proposed. Unlike in the traditional solution frameworks, where topology optimization is achieved by eliminating unnecessary materials from the design domain or evolving the structural boundaries, optimal structural topology is obtained by optimizing the layout of morphable structural components/voids in the proposed approach. One of the advantages of the proposed approach is that it can integrate the size, shape, and topology optimization in CAD modeling systems seamlessly. The approach can combine both the advantages of explicit and implicit geometry descriptions for topology optimization. It also has the great potential to reduce the computational burden associated with topology optimization. Some representative examples are presented to illustrate the effectiveness of the proposed approach.

References

- [1] W. Zhang, J. Zhang, X. Guo, J. Appl. Mech. 83 (2016) 041010.
- [2] W. Zhang, J. Yuan, J. Zhang, X. Guo, Struct. Multidiscip. Optim. 53 (2016) 1243-1260.
- [3] X. Guo, W. Zhang, W. Zhong, J. Appl. Mech. 81 (2014) 081009.