11th World Congress on Structural and Multidisciplinary Optimisation
07th -12th, June 2015, Sydney Australia

Topology Optimization for Conceptual Architectural Design

Yi Min (Mike) Xie

RMIT University, Melbourne, Australia, mike.xie@rmit.edu.au

Abstract

Topology optimization has been widely used and accepted by the automotive and aerospace industries for reducing weight and improving performance. In stark contrast, the success of applying topology optimization techniques in architectural design is patchy. We provide an overview of examples, from various research institutions and design offices, of conceptual architectural designs generated from topology optimization techniques over the past two decades. A few of these designs have since been built, but most others remain to be "interesting ideas" and "pretty pictures".

We discuss challenges in making topology optimization tools more accessible to architects, and new techniques that need to be developed for the conceptual architectural design of buildings and bridges [1-3].

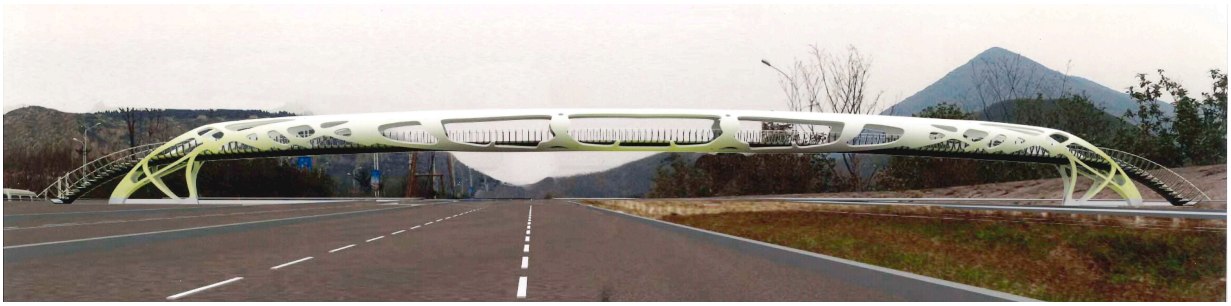

Fig. 1 A footbridge designed using BESO method for Suzhou, China [2].

References

[1] N. Aage, O. Amir, A. Clausen, L. Hadar, D. Maier and A. Søndergaard, Advanced topology optimization methods for conceptual architectural design, Advances in Architectural Geometry 2014, P. Block, J. Knippers, N.J. Mitra, W. Wang (Eds.), Springer, London, 2015 (ISBN: 978-3-319-11417-0).

[2] Y.M. Xie, Z.H. Zuo, X. Huang, T. Black and P. Felicetti, Application of topological optimization technology to bridge design, Structural Engineering International, 24(2), 185-191, 2014.

[3] X. Huang and Y.M. Xie, Evolutionary Topology Optimization of Continuum Structures: Methods and Applications, John Wiley & Sons, Chichester, 2010.