

# Level set methods for topological shape optimization of structures and materials

**\*Zhen Luo<sup>1</sup>**

<sup>1</sup>School of Mechanical and Mechatronic Engineering, University of Technology, Sydney (UTS), Australia

\*Corresponding author: [zhen.luo@UTS.EDU.AU](mailto:zhen.luo@UTS.EDU.AU)

**Abstract:** In this speech, we will give recent research trend of topological shape optimization using level set methods. The major focus is the systematic computational design of structures, mechanisms and materials using advanced level-set methods. This lecturer will include three parts: (1) Introduction to recent development of structural topology optimization, (2) topological shape optimization of structures using implicit dynamic surfaces: level-set methods, (3) a powerful parametric level set method for topological shape optimization problems, which can effectively retain the advantages of the standard level-set method, while overcoming the unfavorable numerical issues. The unique characteristics of the level-set based topological shape optimization methods will be discussed, and a future perspective and prospects in this area is also included. Several benchmark numerical examples are used to demonstrate the effectiveness of the level-set based methods.

**Keywords:** Level set method, Topological shape optimization.