The design and development of the preprocessor for 3D S-FEM analysis software

*†C.Q. Wang ¹, M. Li ¹, and R.P. Niu ¹

¹ College of Mathematics, Taiyuan University of Technology, Taiyuan, Shanxi, 030024, China
*Presenting author: chunqiao_wang@foxmail.com
†Corresponding author: chunqiao_wang@foxmail.com

Abstract

The three-dimensional (3D) preprocessor module is a very essential part of smoothed finite element method (S-FEM) software which acts as the link of the calculation module. In this paper, the 3D preprocessor module is implemented using MFC single document structure, which ensures the simplicity and stability of the software. In this module, the graphs can be presented clearly and smoothly by using OpenGL technique which is a powerful underlying graphics library. With the help of the open source software "TetGen", all the information of background meshes and smoothing domains can be obtained, which is stored in databases for easily seeking and operating. Besides, some essential prompt messages are showed in our specific Message Windows to make the software friendly in this module. Based on TetView tool, the visualization of mesh models is implemented, which demonstrates the internal mesh information including points, edges, faces and elements. Therefore, the preprocessor module can supply a friendly GUI platform for users to solve and analyze 3D mechanics problems using various S-FEM models.

Keywords: smoothed finite element method; finite element analysis; TetGen; grid division; 3D visualization