

All-Hexahedral Mesh Generation Based on Virtual Decomposition for Boundary Face Method

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Abstract

The quality and type of the discrete mesh directly affected the accuracy of numerical results in Computer Aided Engineering (CAE) analysis. In practical projects, however, the mechanical parts usually have some special geometry features, such as hole, keyway, chamfer, et al., that make it difficult to generate high-quality mesh. In order to deal with the problem, an all-hexahedral mesh generation approach employ the improved virtual decomposition based on feature recognition method is proposed in this paper. Firstly, all characteristics of the geometric solid are extracted and saved to an feature array using feature recognition. Recycle the array to judge the current feature is whether swept or not. Then locate these swept characters, decompose the complicate solid to several sub-volumes using virtual decomposition method and discrete them to hexahedral mesh with sweep method one by one. Finally, assemble the meshes of all swept sub-volumes and improve the mesh quality with Laplacian smoothing. Some examples illustrate that high-quality hexahedral mesh can be obtained efficiently and robustly with the method.

Keywords: feature recognition, virtual decomposition, sweep method, hexahedral mesh