Unstructured Mesh Generation Using MEGG3D – Mixed-Element Grid Generator in Three Dimensions

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Abstract

An efficient and robust unstructured mesh generator, Mixed-Element Grid Generator in 3 Dimensions (MEGG3D), has been developed [-]. MEGG3D has five key components: (1) a direct advancing front method for surface triangulation based on discrete surface models [,]; (2) a decimation method for triangular meshes with quality enhancement methods [] (Figure 1a); (3) an advancing front method for isotropic tetrahedral mesh generation []; (4) a multiple marching direction method for semi-structured near-field mesh generation []; (5) an octree-based unstructured hexahedral mesh generation method with a new set of refinement templates [] (Figure 1b). MEGG3D is previously known as EdgeEditor and has been demonstrated part of its capability for generating meshes for complex geometries.

In this paper, we will summarize the current capability of MEGG3D and show variety of meshes for complex geometries.

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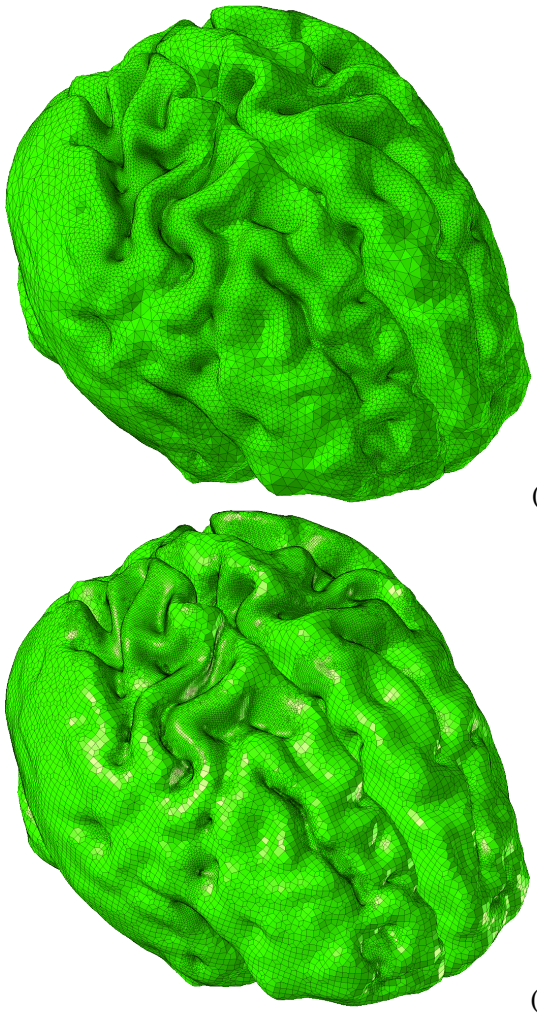

(a)

(b)

Figure 1. Meshes for a human brain model: (a) tetrahedral mesh; (b) hexahedral mesh