

Efficiency of edge-based finite element method incorporating with automatic unstructured conforming hexahedral mesh for solving three-dimensional magnetotellurics modeling

Weerachai Sarakorn

Department of Mathematics, Faculty of Science, Khon Kaen University, Khon Kaen, 40002, Thailand (wsarakorn@kku.ac.th)

In this research, we present an edge-based finite element (EFE) method incorporating with the new automatic unstructured conforming hexahedral mesh for solving three-dimensional magnetotelluric models. The true unstructured conforming hexahedral mesh without hanging nodes is generated before deriving and constructing the common edge-based finite element scheme without extra approximation. The obtained system of equations is then solved by the PARDISO parallel sparse direct solver package. Efficiency and accuracy of our EFE method with new mesh type is measured and compared with that of EFE with structured hexahedral mesh. The numerical results indicate that the accuracy and efficiency of our EFE method is comparable to that of other methods. The new mesh type can also handle some focus area such as topography, bathymetry, and anomalies more appropriately with true local refinement mesh features.