

Techniques for Visualizing 3D Unstructured Meshes

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Abstract

We present a computational module for interactively visualizing, large-scale, 3D unstructured meshes. Scientists and engineers routinely solve large-scale computational boundary value problems on unstructured grids. These grids typically range from several hundred thousand elements to millions of elements. With this ability to solve such large-scale problems comes the challenge of viewing the 3D finite element model geometry on a 2D screen. When the mesh is non-uniform, the researcher's ability to grasp the complex spatial relationships of the elements often fails.

The visualization module we have developed for viewing large-scale 3D unstructured finite element meshes includes two novel real-time interactive methods: a clipping "surface" utility and a growth algorithm. Used separately or together, these new utilities allow the user to better explore complicated unstructured polygonal domains.