Fast adaptive binary-tree mesh generation

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Abstract:

In this paper, we present a fast adaptive binary-tree mesh generation method which can be used in the boundary face method based on double interpolation. Binary tree is a hierarchical data structure that is computationally attractive for adaptive numerical simulation. The binary-tree method splits the entire domain into two congruent rectangle, and continues splitting rectangle recursively until meeting the requirements of the curvature of surface and curve. This method has two most attractive merits. One of them is the ability to generate discontinuous elements, which allows the presence of so-called hanging points. Based on the above advantage, which make mesh generation more free, the binary-tree method can gracefully deal with arbitrary complex shape of two-dimensional domain. The other is able to accommodate local mesh refinement adaptively, considering geometrical factors and user-specified parameters. Stood on this virtue, this method break away from the time-consuming size field, depending on the background mesh. In this paper, when we balance the binary tree, we consider the area of the cell and the length of the element edge so that transition between adjacent elements is smooth. Treating the boundary elements, we should judge whether a point is inside or outside the object face. we present a novel and general method to judge the status of points. It is verified that the elements generated by the binary tree method are of good quality ,and most of them are rectangular cells. The process of meshing will be described in detail , and the final examples of the meshing will be also viewed in this paper.

keywords：binary tree , mesh generation, discontinuous elements, refine adaptively