Generation of High-Quality Meshes With Optimal Geometric Accuracy

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ABSTRACT

We present a technique to generate curved high-order meshes featuring optimal mesh quality [1, 2] and geometric accuracy [3, 4]. To this end, we combine a distortion measure and a geometric disparity measure into a single objective function [5]. While the element distortion term takes into account the mesh quality [1, 2], the disparity term [3, 5] takes into account the geometric error introduced by the mesh approximation to the target geometry. The resulting meshes approximate the target boundary in a non-interpolative way, providing more flexibility to improve the geometric accuracy and the mesh quality, while repairing the invalid elements. Moreover, we are able to generate a series of meshes that converge to the actual geometry with exponential rate while obtaining high-quality elements. We also show that the proposed method can be applied to untangle high stretched elements and, at the same time, obtain geometrically accurate meshes. Finally, we show that the proposed technique can be applied to three-dimensional geometries.

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