

qADMESH+: An automatic quadrangular and mixed-element mesh generator

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ABSTRACT

In this talk, we introduce a new automatic mesh generator that utilizes multiple techniques for converting any pre-existing, unstructured, triangular mesh into a high-quality, unstructured, quadrilateral/mixed-element mesh. One of the primary motivations for creating this work is to provide a tool for generating meshes that can be used within a discontinuous Galerkin (DG) finite element framework for modeling shallow water flow — a setting where meshes of mixed-element composition can be easily accommodated and where the computational advantages of using quadrilateral elements have been demonstrated [1]. Employed techniques include: A strategic merging sequence of neighboring triangular element pairs to form quadrilaterals, a supplemental post-process routine on elements along domain boundaries, several topological operators designed to improve the quality of elements [2], a direct (i.e., non-iterative) smoothing method [3], and the application of methodologies from a pre-existing triangular-element mesh generator, ADMESH+ [4], into the quadrilateral/mixed-element mesh generation approach.

REFERENCES

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