DOMAIN DECOMPOSITION FOR QUAD MESHING BY MACRO DELAUNAY REFINEMENT

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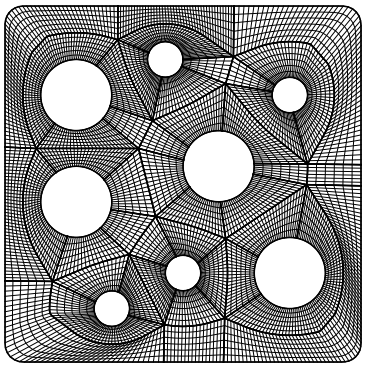
We propose an automatic method to generate quadrilateral meshes, with emphasis on boundary layers, of an arbitrary two-dimensional domain. Our algorithm uses the medial axis and the dual Delaunay decomposition of the domain to analyze its shape and construct a decomposition suitable for multiblock structured quad meshing. The decomposition consists of diffeomorphic images of quads. The network of these morphed quads is conforming and admits a regular communication pattern for parallel computation. Our algorithm includes a novel mesh improvement process called *macro Delaunay refinement* to ensure the quality of the output quad mesh.



Medial axes have been used for domain decomposition for over a decade [2, 3, 6]. We re-examine the problem, perform mathematical analysis, and propose an improvement to the process. Our main contribution is to use macro Delaunay refinement to resolve degeneracies in the medial axis that lead to small angles and vertices with many neighbors. Macro Delaunay refinement is motivated by guaranteed-quality Delaunay meshing algorithms [1, 4, 5]. We will present experimental results to justify our approach.

References

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