COMPUTATIONAL RESEARCH in BOSTON and BEYOND SEMINAR

Local Decomposition of Hexahedral Singular Nodes into Singular Curves

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ABSTRACT:

Hexahedral (hex) meshing is a long studied topic in geometry processing with many fascinating and challenging associated problems. Fully structured meshes require that all interior mesh edges are adjacent to exactly four hexes. Edges not satisfying this criteria are considered singular and indicate an unstructured hex mesh. Singular edges join together into singular curves that may collide at a singular node, a complex junction of more than two singular curves. While all hex meshes with singularities are unstructured, those with more complex singular nodes tend to have more distorted elements and smaller scaled Jacobian values. In this work, we study the topology of singular nodes. We show that all eight of the most common singular nodes are decomposable into just singular curves. We further show that all singular nodes, regardless of edge valence, are locally decomposable. Finally we demonstrate these decompositions on hex meshes, thereby decreasing their distortion and converting all singular nodes into singular curves. With this decomposition, the enigmatic complexity of 3D singular nodes becomes effectively 2D.

FRIDAY, APRIL 1, 2022
12:00 PM – 1:00 PM

https://math.mit.edu/sites/crib/

ZOOM Link…

https://mit.zoom.us/j/96155042770
Meeting ID: 961 5504 2770

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