

## GPU-Accelerated Triangle Mesh Simplification Using Parallel Vertex Removal

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**Abstract :** We present an approach to triangle mesh simplification designed to be executed on the GPU. We use a quadric error metric to calculate an error value for each vertex of the mesh and order all vertices based on this value. This step is followed by the parallel removal of a number of vertices with the lowest calculated error values. To allow for the parallel removal of multiple vertices we use a set of per-vertex boundaries that prevent mesh foldovers even when simplification operations are performed on neighbouring vertices. We execute multiple iterations of the calculation of the vertex errors, ordering of the error values and removal of vertices until either a desired number of vertices remains in the mesh or a minimum error value is reached. This parallel approach is used to speed up the simplification process while maintaining mesh topology and avoiding foldovers at every step of the simplification.

**Keywords :** computer graphics, half edge collapse, mesh simplification, precomputed simplification, topology preserving

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