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Hybrid Grid Generation: A Symbolic Programming Approach

Over the past 25 years, grid generation has been identified as one of the most challenging and key components in a variety of areas in Science and Engineering. We present a novel grid generation based on the octree technique suitable for the decomposition of the 3D geometries in order to generate the hybrid grids. This kind of grids are useful when we want to resolve viscous problems characterized by a high Reynolds number. In this study we will introduce new algorithms to:

- (1) perform a triangular faces recognition and triangular faces ordering, with a complexity of $O(N)$;
- (2) perform the projection of the nodes of the triangular faces on the object with a complexity of $O(N^2)$.

The emphasis is on the rapid production of the geometry with a minimum of the user input. We will also show the feasibility of combining Maple and C++ programming languages as a suitable tool for generating hybrid grids by using specially designed data structures.