LATEST DEVELOPMENT IN VOLUME MESHING FOR CFD

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ABSTRACT
CFD simulations are always at the forefront of memory demanding CAE applications, as size of volume mesh used for them increases continuously. Current CFD simulations for external aerodynamics are performed on meshes of the order of hundreds of millions of elements, while billion size meshes will very soon no longer be considered as exotic. This imposes demanding challenges on the pre-processing software as it has to deliver the maximum mesh size, within the shortest time, and all these on a limited amount of available hardware RAM.

This work summarizes the latest developments in ANSA v19 regarding volume meshing for CFD, which allow it to excel in a very competitive market. Two external aerodynamics cases are presented, one from the automotive and one from the aerospace sectors, each one focusing on the specific demands of the respective industry.

The octree based Hextreme algorithm of ANSA now provides CFD users with very fast mesh generation turnaround times, as it does not rely on watertight geometry or high quality surface mesh, and runs on multiple CPU threads. An appealing match to the automotive industry, which deals with complex geometries and short development cycles.

On the traditional, bottom up, approach of surface meshing, layers generation and volume meshing, an aerospace case is presented with high quality surface meshing exhibiting anisotropy at leading and trailing edges, very fine layers for y+1 modeling and total cell count of hundreds of millions cells. Great improvements in speed and memory footprint for mesh quality improvement and input/output are demonstrated with the introduction of the Light Volume Representation approach, a new optimized data structure in the latest ANSA versions specifically developed for CFD meshing applications.