

OPEN-SOURCE SOFTWARE FOR INDUSTRIAL CAE – A CASE STUDY IN UNSTRUCTURED MESHING

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ABSTRACT

In recent years simulation has become an indispensable tool for virtually any type of manufacturing. Moreover, cloud computing has greatly contributed to lowering the cost of computational resources needed for simulation. However, current licensing models for ISV software are yet to catch up, so running large scale simulations on complex models can become extremely expensive.

The use of open source software for simulation is one way of lowering these costs. Indeed, powerful open source packages like OpenFOAM have been successfully used in industry. However, this is not always the case. Many features needed in industry are missing from such packages, making them difficult to use in production. In this talk we will present our approach of bringing an open source meshing code to the level needed for performing large scale structural analysis on industrial models.

The field of serial unstructured mesh generation using tetrahedral elements is an old and well established one, with several high quality open source mesher packages currently available. Some of the best known and widely used such meshers are Gmsh, TetGen and Netgen. However, all such packages are serial in nature, thus the time taken for meshing assembly models like laptops and servers, with hundreds or thousands of parts, is prohibitively large. In order to address these challenges we have experimented with both automation and a novel decoupled parallelization approach, where the partitioning is done directly at the CAD level. Using the open source OpenCASCADE CAD kernel, large CAD solids are automatically partitioned into smaller ones. Such a partitioning allows us to obtain good parallel performance while still making use of the unmodified serial mesher code.

In this talk we will present details of our investigation, preliminary performance results on a complex industrial model from the electronics industry and some of the challenges that lie ahead.

SUGGESTED THEMES

Open source CAE, parallel unstructured meshing, structural analysis