

DYNAMIC HEXAHEDRAL REMESHING AND FLOW SOLVING

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Keywords: Mesh Motion, Local Re-meshing, Conservative Field Mapping.

This paper describes a capability for mesh-quality based local re-meshing during solver runs with dynamic meshes implemented in iconCFD®. The algorithm allows re-meshing to be applied locally in regions of the geometry where there is motion, thus speeding up re-meshing if the bulk of the geometry is static. The local re-meshing regions are separated from the rest of the mesh by an AMI interface. During each time step of the solver the mesh is moved locally and the resulting mesh quality is checked. If the quality check fails for the deformed mesh, then the deformation is undone, and the local region is re-meshed. The old local mesh is then replaced by the new local mesh in the global mesh. The portions of the volume fields in the local regions are conservatively mapped, using parts of [1], to the new local mesh, and combined with the portions of the corresponding fields in the rest of the mesh to recreate global fields. Boundary fields are mapped and some other objects re-created. After the re-meshing, the solver calculates the solution for the current time step.

The capability has been tested on a number of cases with multiple local re-meshing iterations. Figures 1 and 2 illustrate the mesh and flow solution for a moving cog wheel case, before and after a re-meshing.

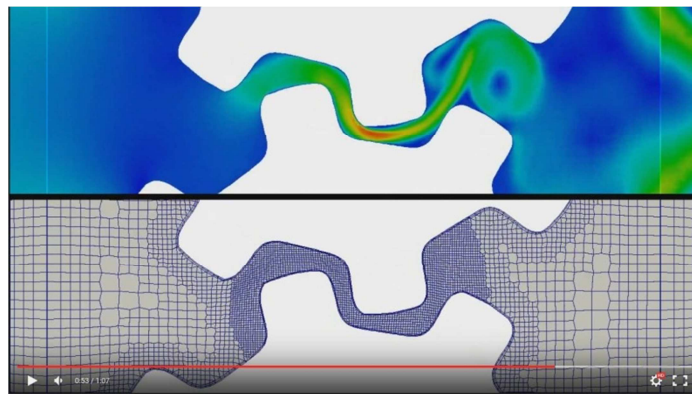


Figure 1: Re-meshing of moving cog wheels just before re-meshing.

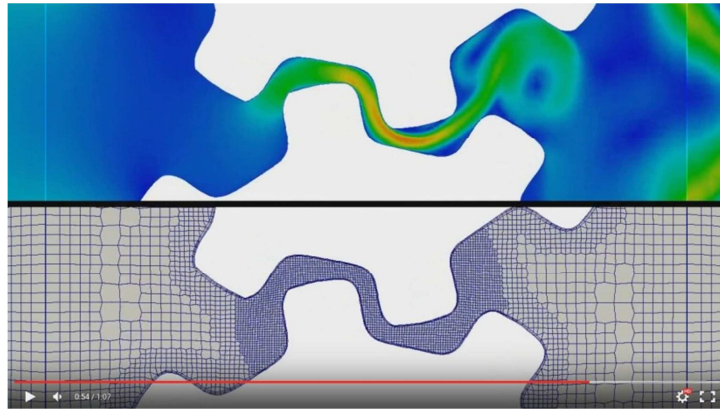


Figure 2: Re-meshing of moving cog wheels just after re-meshing.

REFERENCES

- [1] <https://github.com/smenon/dynamicTopoFvMesh>