

Automatic 3D grid generation between turbo machine blades

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The task of 3D grid generation between turbo machine blade channels with radial gaps is resolved in this work. We observed the generation of structured blocked grid.

The blocks of grid are connected as node to node and we used the periodic condition then they are moved. The general requirement is the automatic grid generation with quality that user needed in order to take of few values as the grid nodes count and physical sizes of boundary cells.

The 3D grid is the result of interpolation which based on superposition of 2D conic curvilinear surface grids.

The base surfaces are placed evenly on radius. The user chooses the count of the base surfaces on needed accuracy of geometrics. The radial gap surface is included into the base surface list.

In order to build the grid we using the barrier variation method. The aim of the optimization procedure is the minimization of the linear combination of the map energy density and the cell size functionals. The using of linear combination of functionals allows to influence upon forms and sizes of the grid cells. In optimization process we used limitation that the grid nodes belong to base surface.

For grid generation around the blade we used two steps because of we need to provide the height of the boundary cells. At the first step we use limitation that the nodes of grid belong to curves which are equidistant to the blade profile.

On the second step this limitation are not used but we take some law which reduces moving of nodes when we achieve the blade profile.

As example, the result of the grid generation for same fan, compressor and turbine geometries are represented..

References

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