

Turbulence in Axial Compressor Inlet Guide Vanes

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In Short

- Large Eddy Simulation (LES) of compressor cascades
- Discontinuous Galerkin method
- Validation and development of RANS turbulence and transition models

More Information

DFG Subject Area

Modelling the influence of turbulence and laminar to turbulent transition is a key challenge for the numerical prediction of turbulent flows in turbomachinery. Within the BMWK project number 03EE5041C "InnoTurbinE" we currently conduct experimental measurements in a linear cascade of an axial compressor inlet guide vane (IGV) at a Reynolds-Number of 780000. The purpose is to generate high resolved measurements for the validation of RANS turbulence and transition models with a focus on the development of turbulence within the cascade. However, measurements can provide those information with limited spatial resolution only, especially close to walls. The physical experiment must therefore be accompanied by turbulence resolving Large Eddy Simulations (LES) to provide a comprehensive dataset for validation of RANS models. Therefore, We will conduct LES with the flow solver TRACE, developed by the DLR and MTU Aero Engines AG, using the discontinuous Galerkin method. The accuracy of this method is of higher order, scales very well on HPC clusters. Its implementation into TRACE makes TRACE a state of the art highly efficient software that suits the requirements of this project.

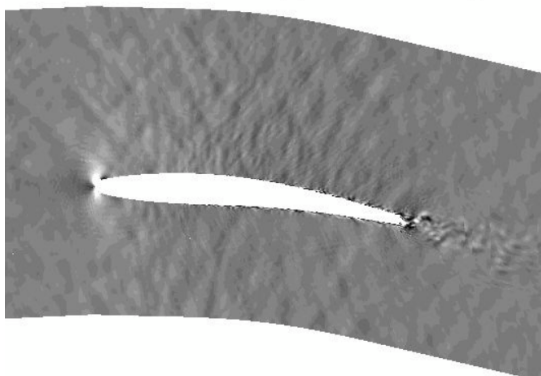


Figure 1: Preliminary LES of the compressor cascade

