Karlsruher Institut für Technologie

Institut für Strömungsmechanik
Geb. 10.23, 6. OG, Kaiserstraße 10, 76131 Karlsruhe
http://www.istm.kit.edu

Master thesis-numerical

CFD modeling of a radial inflow turbine stage

Background:

A radial inflow turbine is a type of turbine in which flow enters the turbine in radial direction and exits the rotor parallel to the axis. Compared to the axial turbines, radial inflow turbines show better efficiencies for low power ranges. Due to their compactness and high pressure ratios, radial inflow turbines are widely used in transport devices. Like any other class of turbomachines, Computational Fluid Dynamics (CFD) is a strong tool in design and optimization of these turbines.

Content of the thesis:

This thesis aims at reconstructing the geometry of a radial inflow turbine stage and its CFD simulation in different working conditions. Meshing software ICEM-CFD will be used along with compressible CFD code –SPARC– for this study. The turbine that will be modeled in this project is a small high-pressure ratio (pressure ratio = 5.7) radial inflow turbine, for which experimental data are available. In the initial stage, only rotor will be studied, but the study will eventually be extended to the whole stage if the initial results are satisfactory. In each stage, the results will be compared to previous CFD solutions and experimental data.

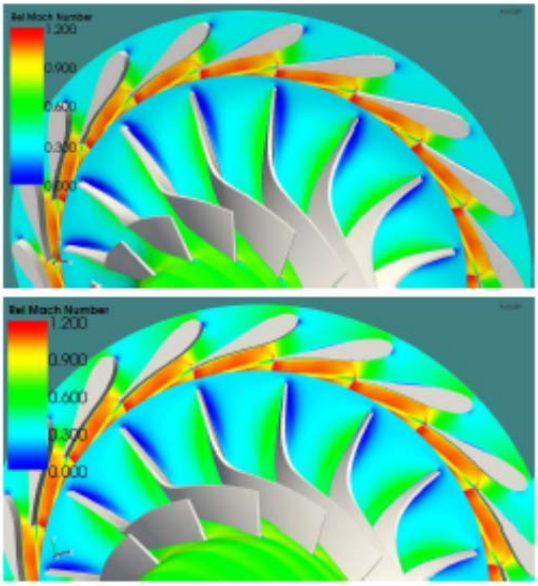

Figure 1. Distribution of Mach number in radial inflow turbine stage (Sauret, IMECHE2012-88315).

Requirements:

Fair knowledge of fluid mechanics

Beneficial Skills:

Some knowledge of CFD and turbomachinery

Contact:

Dr. Ing. Franco Magagnato
franco.magagnato@kit.edu

Pourya Forooghi, PhD
pourya.forooghi@kit.edu