# Numerical Simulation of Flows Through a Radial Turbine

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## Abstract

The article deals with the application of the coupled finite-volume solver for the simulation of turbulent compressible flows through a twin-scroll radial turbine. The solver is based on the OpenFOAM framework [4] and uses the so called Riemann solvers for the approximation of convective fluxes combined with an implicit matrix-free lower-upper symmetric Gauss-Seidel method for discretization in time [1]. The performance of the solver is compared to the performance of segregated pressure correction solvers from OpenFOAM package. The flow through a twin scroll radial centripetal turbocharger turbine is then solved at several regimes using basic turbulence models (e.g. $k-\omega$ SST model, [3]) as well as advanced explicit algebraic Reynolds stress (EARSM) model [2], or using a hybrid RANS-LES approach. Finally the mass flow and the turbine efficiency is evaluated and compared to the experimental data – this includes different operational regimes of a twin-scroll turbine. The measured data were obtained from a special test rig for experimental evaluation of twin-scroll turbines.

## References

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