

Software applications for high performance wind farm flow simulations

Roko Topic

June 9, 2025

For this project, a test case was constructed using the OpenFOAM (OF) v2412 framework. The simulation involves a simple two-dimensional diffuser, set up using an externally provided mesh file. Four individual subcases, each using a different RANS turbulence model, were simulated until reasonable convergence was achieved. Resulting mean, high-order flow statistics and wall adjacent parameters are then plotted and compared to experimental data using a postprocessing python script.

Project is structured as Allrun and Allclean shell scripts which source the selected OF version bashrc file and perform all necessary OF functionalities. One sample case named "common" is placed in the main directory from which Allrun script creates 4 different subcases (kOmegaSST, SpalartAllmaras, kEpsilonPhitF and LaunderSharmaKE). Postprocessing script generates figures in a newly created Figures folder. Allclean script removes all newly created subcases and log files.

The project has been created on a remote computer and has later been added to a git repository:

<https://github.com/Rokotop/DiffuserCase>.

Because of this, only the latest commits are documented. In the repository, global active library list was provided in requirements.txt file. Somewhat more coarse conda environment is also present in CONDAenv.yml document.

Lastly, a Test script is added to do a regression test. It compares the results of user modified Diffuser test case to the reference output values of different OF functionalities, mainly mesh validity and parameter convergence. It has to be run manually. To run the test case **OF v2412** has to be configured and **sourced** manually or through Allrun and Allclean scripts.



UPPSALA
UNIVERSITET