MAN Diesel

Project Proposal

Develop actuator-disk[1] boundary condition for OpenFOAM®

Problem/challenge
Analysing impact on performance with regards to changing some geometrical properties can be a cumbersome task. To ease this process, the propeller is often replaced with an actuator disk. The current CFD software used at MAN-Diesel, employs an uniform loaded, purely axial actuator disk model. This is not sufficient to model the propeller and the impact on neglecting non-uniform loading and swirl generated by the propeller could be significant i some cases.
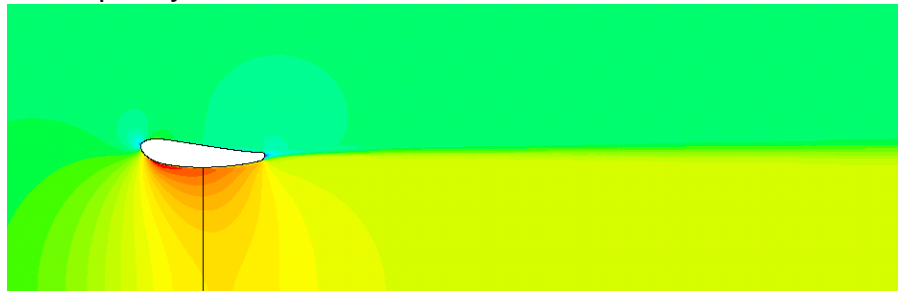
Project proposal
The project has focus on developing a boundary condition for axisymmetric and full 3D models in OpenFOAM, with emphasis on:
- Non-uniform loading of actuator-disk momentum.
- Add swirl/tangential velocity at the actuator disk
- Input to model should be based on table data

MAN Diesel will assist by providing practical examples for thorough investigation and to explain, discuss and demonstrate the existing procedures. To verify the model some experimental results are needed, and could for example, but not limited to, be measurements of flow-field downstream of a fan with CTA (hotwire) or pitotube. These results can be used to determine the loading and swirl for use in the CFD.

Project goals
Develop actuator-disk boundary condition in OpenFOAM to model a propeller.

Contact
If you are interested in working with this project please contact us for a discussion on the subject and a visit to our company for a presentation of our products and projects.

MAN Diesel
Niels E. Linnemann Nielsen
Niels Juels vej 15
DK-9900 Frederikshavn
Denmark
+45 96204252
Nielsl.nielsen.a@man.eu

1: Filippone, A., Chollet, J. P. and Lewandowska, J. *CFD actuator disk solutions for a helicopter rotor in hover flight*, 2008 sep.