NUMERICAL SIMULATION OF STIRRED TANK REACTOR

FOSSEE RESEARCH MIGRATION REPORT

by

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Numerical simulation of s stirred tank reactor (STR) has been carried out using OpenFOAM version 9 computational fluid dynamics (CFD) software. In an STR, the rotating impeller may be of Rushton type or of pitched-blade type. The impeller rotates with certain RPM (revolution per minute) and depending upon the Reynolds number (Re), the flow may be laminar or turbulent. To facilitate numerical simulation, the moving reference frame (MRF) has been adopted surrounding the impeller. In the present study, (1) a research migration project has been taken up and (2) problem suggested by FOSSEE has been solved.

The problem of Harvey III et al. [1995] has been chosen as research migration project. Here, the single impeller four number 45° pitched blades rotate with Re=33. Here the geometry has been created in FreeCAD software Riegel et al.. The stl files are imported in OpenFOAMGreenshields [14th July 2021] and mesh is generated by snappyHexMesh. The application *simpleFoam* is used to compute the formulated problem. The radial, tangential and axial velocities at four different axial locations are compared with the experimental and computational results of Harvey III et al. [1995]. Good agreement in the comparison has been obtained.

Once the validation work has been done, the Rushton impeller of two numbers having four blades each are modeled in FreeCADRiegel et al.. The stl files are imported in OpenFOAM, mesh generated and the problem is solved using application *simpleFoam*. Several RPMs are considered and the results are plotted along the radial direction.

References

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