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CFD modeling of single-phase flow in a stirred tank reactor

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Synopsis

The primary aim of this project is to validate the single-phase simulation in a stirred tank reactor with the experimental results conducted by [1] using OpenFOAM and understand the flow characteristics due to the Rushton turbine. simpleFoam is a steady incompressible solver which is used in this study. The normalized radial and tangential velocities by the tip velocity are compared with [1]. A Multiple Reference Frame(MRF) model is employed to simulate the rotating impeller blade of the Rushton turbine and the k-ϵ turbulence model is used for the study. The same kind of study has been done in [2] using Ansys Fluent.

References

[1] H Wu and GK Patterson. Laser-doppler measurements of turbulent-flow parameters in a stirred mixer. *Chemical engineering science*, 44(10):2207–2221, 1989.

[2] David A Deglon and Christiaan J Meyer. Cfd modelling of stirred tanks: Numerical considerations. *Minerals Engineering*, 19(10):1059–1068, 2006.