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Data Article

Data on the mixing of non-Newtonian fluids by a Rushton turbine in a cylindrical tank

Akhilesh Khapre*, Basudeb Munshi

Department of Chemical Engineering, National Institute of Technology, Rourkela, Odisha, India

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ABSTRACT

The paper focuses on the data collected from the mixing of shear thinning non-Newtonian fluids in a cylindrical tank by a Rushton turbine. The data presented are obtained by using Computational Fluid Dynamics (CFD) simulation of fluid flow field in the entire tank volume. The CFD validation data for this study is reported in the research article 'Numerical investigation of hydrodynamic behavior of shear thinning fluids in stirred tank' (Khapre and Munshi, 2015) [1]. The tracer injection method is used for the prediction of mixing time and mixing efficiency of a Rushton turbine impeller.

Specifications Table

Subject area	*Chemical Engineering*
More specific subject area	*Fluid Mechanics*
Type of data	*Tables, figures*
How data was acquired	*By simulating whole 3D domain of baffled cylindrical tank*
Data format	*Analyzed*
Experimental factors	*Carboxymethyl cellulose and Xanthangum solution are used as a working shear thinning non-Newtonian fluids for simulation*

* Corresponding author.
E-mail address: akhilesh_khapre@yahoo.co.in (A. Khapre).

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Experimental features	*For simulation, the Ansys 13 is used to solve the continuity, momentum and species transport equations. A known concentration of a tracer which has same physical property of working fluid is injected in tank for mixing time prediction. The sliding mesh approach is applied for calculation of the mixing time in tank. The strain and vorticity tensors are calculated from simulated flow field inside a tank.*
Data source location	*Rourkela, India*
Data accessibility	*With this article*

Value of the data

- The data help to predict the performance of a Rushton turbine in a cylindrical tank in terms of mixing efficiency.
- It provides significant information about the mixing time in the transition and turbulent flow zone.
- It is also useful to explore the nature of the fluid flow and dispersive mixing efficiency inside the tank.

1. Data

In this article, the data generated on mixing of shear thinning non-Newtonian fluids by a Rushton turbine in a cylindrical tank is reported. The data is obtained using CFD simulation of whole tank. The validation of this study is found in [1]. The data presented herein showed some significant information about the mixing time and dispersive mixing efficiency of a Rushton turbine. We include figures and tables containing quantitative and qualitative information on the mixing time and its dispersive efficiency.

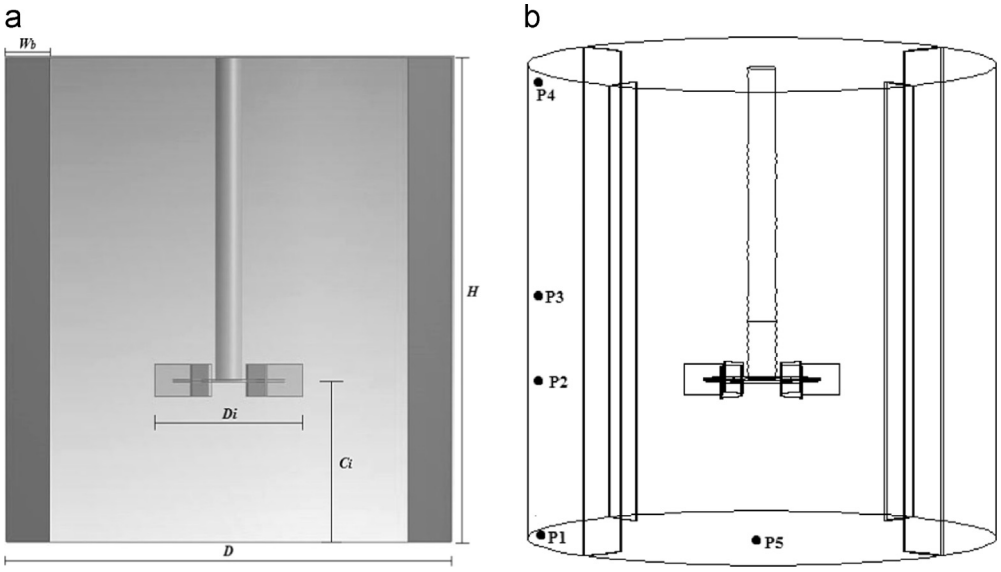

Fig. 1. (a) Geometry of cylindrical tank, (b) the detail of locations in a tank: P_1 (0.313, 0.05), P_2 (0.313, 0.209), P_3 (0.313, 0.3135), P_4 (0.313, 0.62) and P_5 (0.0, 0.0) (all measuring locations in (r, z) coordinate system).