IT Services

Case Study

BlueBEAR provides a substantial computing resource that properly supports the research work of research staff and students at Birmingham. It provides a cost effective facility that optimises the effectiveness of research and ensures the University continues to be a world-class academic learning and research environment.

"Micro- and Macromixing Studies in Two- and Three-Phase (Gas-Solid-Liquid) Stirred Chemical Reactors"

Problem

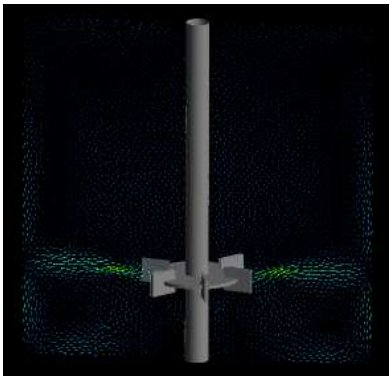
Mixing on a molecular scale (micromixing) has been studied extensively because of its potential importance in industrial chemical reactors, which are commonly used in pharmaceutical, chemical, bio-chemical and other industries. Better understanding of these phenomena would be beneficial for optimising product distributions, for instance to achieve required yield and quality of the product in polymerisation or precipitation. In this study, mixing in baffled and unbaffled stirred tanks is of particular interest and detailed information about the fluid flow in these two cases might help interpreting or even explaining results from experimental work.

Method

In addition to well established experimental techniques, computer simulations, i.e. Computational Fluid Dynamics (CFD), can be helpful for studying fluid flow phenomena using numerical methods. Models of baffled and unbaffled stirred vessels are being simulated using the commercial software package CFX. The region around the feed pipe is of particular importance for micromixing and is resolved with fine structured meshing.

Results and Discussion

The results from CFD simulations are being validated with experimental findings, like for instance the impeller power number, and should lead to a better understanding of the studied cases. In the long run, established models might be used solely to look at various potential scenarios applied to stirred reactors for achieving better results without the need for expensive and cumbersome experiments.



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Product Used
Ansys CFX

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Enriching lives through innovation

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