346d Issues in CFD Prediction of Rate Related Processes in Stirred Tanks

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CFD has been used to model flows in stirred tanks for many years. Different levels of success have been achieved for this purpose. For example, it has been widely accepted that CFD can predict mean flow of a turbulent flow in a stirred tank with reasonable accuracy using k-*f*' model. LES turbulence models have been considered for more accurate prediction of time dependent turbulent flows. Time dependent turbulent flows in stirred tanks have been solved using LES. More recently some macro instability frequencies measured in lab experiments have been correctly predicted with LES.

Although, good prediction of flow field is important, we should keep in mind that the ultimate goal for a stirred tank is mixing and associated processes. Many of these processes are rate determined. Therefore, time dependent flows in stirred tanks need to be predicted correctly and quantitative accuracy of such CFD solutions are key. Are today's CFD codes and computers ready to satisfy such quantitative requirements? What are preventing us from obtaining accurate mixing and other rate related results? In this talk, we will first reaffirm what process industry is looking for from CFD solutions. Then we will discuss some key challenges/obstacles in our way to achieve such solutions.