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Abstract

Mixing is an important unit operation in the process industry. Ensuring homogeneity of slurry or emulsion is critical for subsequent processing or to improve the efficacy of reactions, and heat/mass transfer. Mixing in stirred tanks is typically improved through baffles. While baffles are good at breaking vortices, they contribute to energy dissipation. Most of the previous research focused on improving impeller designs, its position and operation. Limited investigations exist that probe the design improvements of baffles. In this work, through an extensive computational fluid dynamics study involving multi-phase flow simulations using volume of fluid (VOF) approach and Lagrangian particle tracking, we have designed an effective mixing system with optimum baffling. The newly designed baffle, called *interface baffle*, is placed at the interface between air and liquid to break the vortex and redirect the flow to the center. The predicted mixing behavior is experimentally validated in a pilot scale tank of 100 liter capacity. Particle size distribution measurements of samples from the top and the bottom of the tank were used to establish the effectiveness of mixing. Experiments were conducted under three differ-

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