Abstract

This thesis aims to study the effect of a second impeller on the enhancement of the solid/liquid mixture in an industrial stirred tank by analyzing the flow patterns and their effect on the power consumption. The simulation parameters were continually tuned up until no enhancement on the predicted power was achieved. The Moving Reference Frame (MRF) model has been found to give adequate qualitative results for the steady-state simulation of stirred tanks.

Computational Fluid Dynamics (CFD) software Fluent 6.3.26 was used to simulate flow in the real baffled tank of particular geometry. CFD simulation results are analyzed in terms of the predicted flow field, axial velocity component, turbulent kinetic energy and turbulent intensity and evaluated using the power obtained from experimental data. The general flow field and mean fluid velocity predictions were strongly influenced by either the turbulence model or the discretization scheme.

The results revealed a qualitative answer to the problem proposed as well as the path to improve the mixing quality in this particular stirred tank.

Keywords: Stirred, Tank, Power, CFD, Turbulence Model