Abstract

Churn-turbulent flow of gas and liquid phase are simulated in a cylindrical bubble column reactor in laboratory scale. The model is established in a full three dimensional, unsteady state mode in an Euler-Euler multiphase modeling approach. Numerical solution of model equations is carried out by finite-volume tensor-based formulation method using open-source CFD package (OpenFOAM). The attempt is made to assess the performance and applicability of two different turbulence models named RSM and RNG k–? for modeling turbulence in churn fully turbulent flow of bubble column. For this purpose, the predictions are compared with the experimental data from literature. Performance of the turbulence models is assessed on basis of comparison of axial liquid velocity, turbulent kinetic energy and their impact on bubble breakup predictions. It is found that simulated data using RSM model has better agreement with the experimental data in comparison with RNG k–?.
An Assessment on the Performance of Reynolds Stress Model (RSM) in Modeling Churn Fully Turbulent Flow in Bubble Column Reactors


Index Terms
Computer Science
Applied Sciences

Keywords
Bubble column Turbulence Hydrodynamics CFD OpenFOAM