Implementation of custom drag model in a bubble column reactor

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Abstract

In biotechnological and chemical technology fields there are various applications of bubble column reactor which is significant from other equipment. At the basics the bubble column is a structure in which water is filled inside and gas is passed through it from the bottom. The behaviour of gas bubbles greatly affects the efficiency of these processes. This research uses a custom drag force model which is based on the Ishii Zuber drag force model to test the air phase volume fraction in a bubble column domain. The setup includes a bubble column which is of the cylindrical domain where the gas phase is injected into the liquid with the help of a sparger at a superficial gas velocity of 10 cm/s. The multiphase CFD model is created using OpenFOAM v7, a free and open-source software, to analyse the flow interaction between the gas-liquid phase system. The study looks at the different height in the bubble column and the time averaged Air phase volume fraction is found at all locations to study the spread of air molecules within the column, and the end analysis results had been compared with existing liable experimental data from the research papers based on the bubble column literatures.

KEYWORDS: OpenFOAM, CFD, Bubble Column, Multiphase