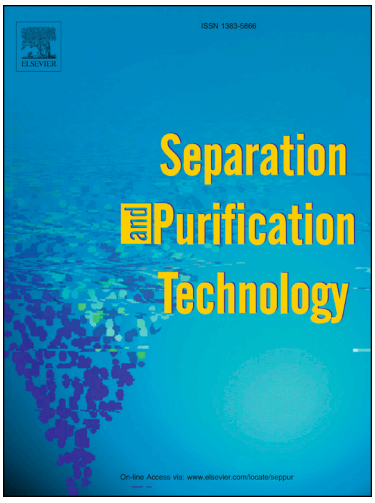

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PII: S1383-5866(17)32295-5
DOI: https://doi.org/10.1016/j.seppur.2017.09.055
Reference: SEPPUR 14064

To appear in: *Separation and Purification Technology*

Received Date: 18 July 2017
Revised Date: 19 September 2017
Accepted Date: 26 September 2017

Please cite this article as: F. Keshavarz Shenastaghi, S. Roshdi, N. Kasiri, M. HasanKhanof, CFD simulation and experimental validation of bubble cap tray hydrodynamics, *Separation and Purification Technology* (2017), doi: https://doi.org/10.1016/j.seppur.2017.09.055

CFD simulation and experimental validation of bubble cap tray hydrodynamics

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Abstract

In this study, numerical simulations of gas-liquid flow behavior of bubble cap tray have been done. The aim of this work is to develop a Computational Fluid Dynamic (CFD) model enable of predicting the hydrodynamic parameters of any desired system. A transient three-dimensional model in Eulerian framework with standard k-ε turbulence model has been developed, ignoring mass and energy transfer equations. For this purpose a new correlation of liquid hold-up with 7.89% average error has been developed using Genetic Algorithm based on the experimental clear liquid height data. By substitution of this correlation in drag force relation, the source term has been added to the momentum equations. Simulations have been carried out over a wide range of liquid and vapor flow rates and the predicted results have been found to be in reasonable agreement with the experimental data. Velocity and pressure distributions, clear liquid height,