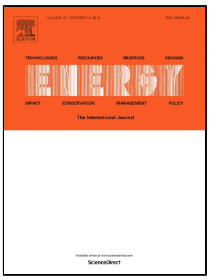
Accepted Manuscript



Research on the CFD Numerical Simulation of Flash Boiling Atomization

Bi Rongshan, Chen Chen, Li Jiansong, Tan Xinshun, Xiang Shuguang

PII:	S0360-5442(18)31913-3
DOI:	10.1016/j.energy.2018.09.143
Reference:	EGY 13837
To appear in:	*Energy*
Received Date:	26 April 2018
Accepted Date:	20 September 2018

Please cite this article as: Bi Rongshan, Chen Chen, Li Jiansong, Tan Xinshun, Xiang Shuguang, Research on the CFD Numerical Simulation of Flash Boiling Atomization, *Energy* (2018), doi: 10.1016/j.energy.2018.09.143

Research on the CFD Numerical Simulation of Flash Boiling Atomization

Bi Rongshan[1]*, Chen Chen[1], Li Jiansong[2], Tan Xinshun[2], Xiang Shuguang[1]

[1]*College of Chemical Engineering, Qingdao University of Science and Technology, Qingdao, China, 266000*

[2]*Research Center for Computer and Chemical Engineering, Qingdao University of Science and Technology, Qingdao, China, 266000*

**Corresponding author, email: birongshan@163.com*

Abstract: Flash boiling atomization (FBA) can achieve the droplets with smaller diameter and more uniform diameter distribution compared with the traditional atomization, which therefore can contribute to accomplishing higher mass and heat transfer efficiency in the gas-liquid ejector. However, the research on the mechanism of FBA was still insufficient, especially that there is not yet a recognized and reliable model which can integrate the factors during FBA process. In this work, FBA model was established based on the traditional primary breakup model, which was then compared with the cited experimental data to verify the reliability of the model. Afterwards, the FBA model was adopted to study the influence of the vaporization ratio, surface tension, density and viscosity of the droplets on the atomization efficiency. The results showed that with the increase in the vaporization ratio and density, smaller droplets with more uniform diameter distribution were obtained; while the increase in the surface tension and viscosity caused the increase in the droplet diameter and discreteness of the diameter distribution.

Key words: Flash boiling; Droplet size and distribution; CFD; Simulation

1. Introduction

The ejector has been widely used as energy saving equipment in the field of petrochemical engineering, fuel cell, air conditioner etc. due to the merits, such as, the high mass transfer efficiency, strong mixing effect, low production cost and high compression ratio [1-5]. Lots of research work has been carried out on the multiphase ejections, among which, the study of gas-liquid ejectors plays an important role [6,7]. For the gas-liquid ejector with liquid as the primary