

Accepted Manuscript

Modelling and numerical simulation of coupled transport phenomena with phase change: mixture evaporation from a rectangular capillary

Sebastian Rieks, Eugeny Y. Kenig

PII: S0009-2509(17)30760-1
DOI: <https://doi.org/10.1016/j.ces.2017.12.023>
Reference: CES 13958

To appear in: *Chemical Engineering Science*

Received Date: 29 September 2017
Accepted Date: 13 December 2017

Please cite this article as: S. Rieks, E.Y. Kenig, Modelling and numerical simulation of coupled transport phenomena with phase change: mixture evaporation from a rectangular capillary, *Chemical Engineering Science* (2017), doi: <https://doi.org/10.1016/j.ces.2017.12.023>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Modelling and numerical simulation of coupled transport phenomena with phase change: mixture evaporation from a rectangular capillary

Sebastian Rieks^a, Eugeny Y. Kenig^{a,b,*}

^a*Chair of Fluid Process Engineering, Paderborn University, Pohlweg 55, 33098 Paderborn, Germany*

^b*Gubkin Russian State University of Oil and Gas, Moscow, Russian Federation*

Abstract

Understanding of transport phenomena in fluid-fluid two-phase systems is essential for many engineering applications. When evaporation or condensation is considered, there exists a two-way coupling of momentum, heat and species transfer, i.e. the fluid flow influences the heat and species transfer and vice versa. The CFD-based simulation of evaporating and/or condensing flows requires models and numerical solution techniques for two-way coupled transport equations and their boundary conditions. Most results on transport phenomena in systems with phase change available in the literature are restricted by either isothermal or one-component systems. Recently we have proposed an approach for modelling and simulation of two-way coupled transport phenomena in non-isothermal two-phase binary systems and performed a first validation using some one-dimensional problems (Rieks & Kenig, 2018). In the present work, a further, more sound validation of the new model and simulation code is accomplished to govern two-dimensional systems.

Keywords: Computational Fluid Dynamics, coupled transport phenomena, phase change, Volume-of-Fluid method, capillary force

*Corresponding author

Email address: eugeniy.kenig@upb.de (Eugeny Y. Kenig)

Download English Version:

<https://daneshyari.com/en/article/6588606>

Download Persian Version:

<https://daneshyari.com/article/6588606>

[Daneshyari.com](https://daneshyari.com)