

Accepted Manuscript

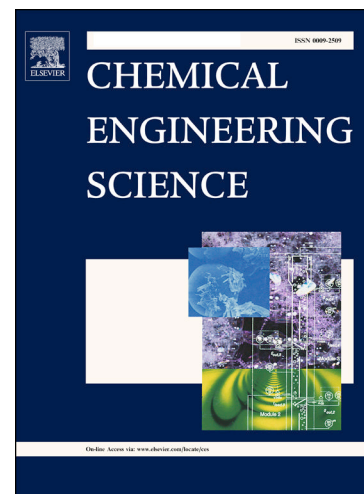
Modelling and numerical simulation of coupled transport phenomena with phase change: layer evaporation of a binary mixture

Sebastian Rieks, Eugeny Y. Kenig

PII: S0009-2509(17)30656-5
DOI: <https://doi.org/10.1016/j.ces.2017.10.040>
Reference: CES 13872

To appear in: *Chemical Engineering Science*

Received Date: 16 May 2017
Accepted Date: 25 October 2017



Please cite this article as: S. Rieks, E.Y. Kenig, Modelling and numerical simulation of coupled transport phenomena with phase change: layer evaporation of a binary mixture, *Chemical Engineering Science* (2017), doi: <https://doi.org/10.1016/j.ces.2017.10.040>

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: layer evaporation of a binary mixture

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

In spite of intense research on coupled transport phenomena in fluid systems, their rigorous modelling and simulation still remains a challenge, especially if a phase change is involved. In this case, the mathematical description becomes particularly interrelated and complex. In the literature, usually only few selected aspects of such problems are considered, e.g. in isothermal or one-component systems. In this work, a more holistic approach is suggested comprising promising concepts available in the literature. The resulting model and relevant code for the *Computational Fluid Dynamics* (CFD)-simulation of momentum, total mass, species, and heat transfer in two-phase binary systems are free of any heuristic or empirical parameters and thus are applicable to a wide range of problems. Several one-dimensional simulation cases are considered to provide a first validation of the model.

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

1. Introduction

Transport phenomena within and between fluid media play a key role in numerous unit operations of process engineering, e.g. in distillation or extrac-

*Corresponding author

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

Download English Version:

<https://daneshyari.com/en/article/6588861>

Download Persian Version:

<https://daneshyari.com/article/6588861>

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