

Accepted Manuscript

Predictive model for the scale out of small channel two-phase flow contactors

Eduardo Garciadiego Ortega, Dimitrios Tsaoulidis, Panagiota Angeli

PII: S1385-8947(18)31059-3
DOI: <https://doi.org/10.1016/j.cej.2018.06.020>
Reference: CEJ 19231

To appear in: *Chemical Engineering Journal*

Received Date: 1 March 2018
Revised Date: 1 June 2018
Accepted Date: 4 June 2018



Please cite this article as: E.G. Ortega, D. Tsaoulidis, P. Angeli, Predictive model for the scale out of small channel two-phase flow contactors, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.06.020>

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.

Predictive model for the scale out of small channel two-phase flow contactors

Eduardo Garciadiego Ortega, Dimitrios Tsaoulidis, and Panagiota Angeli*
(p.angeli@ucl.ac.uk)

ThAMeS Multiphase, Department of Chemical Engineering, University College London,
WC1E 7JE, London, UK

Abstract

In this paper, double manifolds are theoretically investigated for the scale-out of two-phase incompressible flows in small channels. Statistical descriptors are proposed to characterise the maldistribution of the total flow rate and the ratio of the flow rates in the two-phase channels, based on the variances and covariance of the flow rates of the two fluids. A novel resistance network model is developed that relates the flowrates of the fluids in the two-phase channels to the hydraulic resistances of the manifold. The statistical descriptors and the resistance network model are then used to develop relationships between the maldistribution coefficients and the hydraulic resistances of the double manifold, the overall pressure drop and the pumping power requirements for different parallel channel numbers. Based on these, scaling laws are proposed that maintain a constant degree of maldistribution for a scale-up factor of up to 10^2 . Double manifolds designed using these scaling laws have a constant pressure drop as the number of channels increases, whilst the power requirements increase linearly. The power requirements are inversely proportional to the phase ratio maldistribution descriptor. Recommendations for the design of double manifolds for the scale-out of two-phase systems are proposed.

Keywords

Scale-out; Number-up; Microreactor; Flow distribution; Resistance network; Incompressible two-phase flow

Download English Version:

<https://daneshyari.com/en/article/6578462>

Download Persian Version:

<https://daneshyari.com/article/6578462>

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