

Author's Accepted Manuscript

Upscaling immiscible two-phase dispersed flow in homogeneous porous media: A mechanical equilibrium approach

O.A. Luévano-Rivas, F.J. Valdés-Parada



www.elsevier.com/locate/ces

PII: S0009-2509(14)00718-0
DOI: <http://dx.doi.org/10.1016/j.ces.2014.12.004>
Reference: CES12028

To appear in: *Chemical Engineering Science*

Received date: 5 September 2014
Revised date: 19 November 2014
Accepted date: 1 December 2014

Cite this article as: O.A. Luévano-Rivas, F.J. Valdés-Parada, Upscaling immiscible two-phase dispersed flow in homogeneous porous media: A mechanical equilibrium approach, *Chemical Engineering Science*, <http://dx.doi.org/10.1016/j.ces.2014.12.004>

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 galley proof before it is published in its final citable 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.

Upscaling immiscible two-phase dispersed flow in homogeneous porous media: A mechanical equilibrium approach

O.A. Luévano-Rivas^a, F.J. Valdés-Parada^{a,*}

^a*División de Ciencias Básicas e Ingeniería, Universidad Autónoma Metropolitana-Iztapalapa.
Av. San Rafael Atlixco 186, col. Vicentina, 09340 Mexico, Mexico*

Abstract

In this work, we model immiscible two-phase dispersed flow in homogeneous porous media by upscaling the governing mass and momentum transport equations at the pore scale using the method of volume averaging. The model consists of a closed set of macroscopic equations for mass and momentum transport applicable for the dispersed and continuous phases. Furthermore, under the local mechanical equilibrium assumption, only one macroscopic equation arises for momentum transport, which resembles an extension of Darcy's law; whereas for mass transport, the equilibrium model reduces to the continuity equation. These macroscopic models are written in terms of effective medium coefficients that are computed from solving the associated closure problems in representative regions of the pore scale. After performing a parametric analysis, we observe that the magnitude of the longitudinal component of the permeability-like coefficient increases with the saturation and viscosity of the dispersed phase. We validated the model by comparing the predictions of the permeability coefficient with experimental data available in the literature. The results exhibit a relative error percent that ranges from 1 % to 15 %.

Keywords: Immiscible two-phase dispersed flow, upscaling, volume averaging, permeability predictions.

*Corresponding author. E-mail: iqfv@xanum.uam.mx

Download English Version:

<https://daneshyari.com/en/article/6590224>

Download Persian Version:

<https://daneshyari.com/article/6590224>

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