

Accepted Manuscript

Longitudinal dispersion coefficients for numerical modeling of groundwater solute transport in heterogeneous formations

Jonghyun Lee, Massimo Rolle, Peter K. Kitanidis

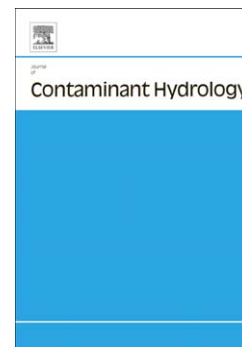
PII: S0169-7722(17)30076-1
DOI: doi:[10.1016/j.jconhyd.2017.09.004](https://doi.org/10.1016/j.jconhyd.2017.09.004)
Reference: CONHYD 3335

To appear in: *Journal of Contaminant Hydrology*

Received date: 20 March 2017
Revised date: 20 August 2017
Accepted date: 12 September 2017

Please cite this article as: Lee, Jonghyun, Rolle, Massimo, Kitanidis, Peter K., Longitudinal dispersion coefficients for numerical modeling of groundwater solute transport in heterogeneous formations, *Journal of Contaminant Hydrology* (2017), doi:[10.1016/j.jconhyd.2017.09.004](https://doi.org/10.1016/j.jconhyd.2017.09.004)

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 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.



Longitudinal dispersion coefficients for numerical modeling of groundwater solute transport in heterogeneous formations

Jonghyun Lee^{1,2,*}, Massimo Rolle³, Peter K. Kitanidis¹

Abstract

Most recent research on hydrodynamic dispersion in porous media has focused on whole-domain dispersion while other research is largely on laboratory-scale dispersion. This work focuses on the contribution of a single block in a numerical model to dispersion. Variability of fluid velocity and concentration within a block is not resolved and the combined spreading effect is approximated using resolved quantities and macroscopic parameters. This applies whether the formation is modeled as homogeneous or discretized into homogeneous blocks but the emphasis here being on the latter. The process of dispersion is typically described through the Fickian model, *i.e.*, the dispersive flux is proportional to the gradient of the resolved concentration, commonly with the Scheidegger parameterization, which is a particular way to compute the dispersion coefficients utilizing dispersivity coefficients. Although such parameterization is by far the most commonly used in solute transport applications, its validity has been questioned. Here, our goal is to investigate the effects of heterogeneity and mass transfer limitations on block-scale longitudinal dispersion and to evaluate under which conditions the Scheidegger parameterization is valid. We compute the relaxation time

*Corresponding author

Email addresses: `jonghyun.harry.lee@hawaii.edu` (Jonghyun Lee),
`masro@env.dtu.dk` (Massimo Rolle), `peterk@stanford.edu` (Peter K. Kitanidis)

¹Department of Civil and Environmental Engineering, Stanford University, 473 Via Ortega, Stanford, CA, 94305, USA

²Department of Civil and Environmental Engineering and Water Resources Research Center, University of Hawaii at Manoa, Honolulu, HI, 96822, USA

³Department of Environmental Engineering, Technical University of Denmark, 2800 Kgs., Lyngby, Denmark

Download English Version:

<https://daneshyari.com/en/article/8885810>

Download Persian Version:

<https://daneshyari.com/article/8885810>

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