

In Memoriam Adelina Georgescu

GLOBAL RANDOM WALK SIMULATIONS FOR SENSITIVITY AND UNCERTAINTY ANALYSIS OF PASSIVE TRANSPORT MODELS*

Nicolae Suciu[†] Călin Vamoș[‡] Harry Vereecken[§] Peter Knabner[¶]

Abstract

The Global Random Walk algorithm (GRW) performs a simultaneous tracking on a fixed grid of huge numbers of particles at costs comparable to those of a single-trajectory simulation by the traditional Particle Tracking (PT) approach. Statistical ensembles of GRW simulations of a typical advection-dispersion process in groundwater systems with randomly distributed spatial parameters are used to obtain reliable estimations of the input parameters for the upscaled transport model and of their correlations, input-output correlations, as well as full probability distributions of the input and output parameters.

MSC: 65M75, 82C70, 65C05

*Accepted for publication on November 15, 2010.

[†]suciu@am.uni-erlangen.de, Chair for Applied Mathematics I, Friedrich-Alexander University Erlangen-Nuremberg, Germany, and nsuciu@ictp.acad.ro, Tiberiu Popoviciu Institute of Numerical Analysis, Romanian Academy, Cluj Napoca, Romania.

[‡]cvamos@ictp.acad.ro, Tiberiu Popoviciu Institute of Numerical Analysis, Romanian Academy, Cluj Napoca, Romania.

[§]h.vereecken@fz-juelich.de, Agrosphere Institute IBG-3, Research Center Jülich, Germany.

[¶]knabner@am.uni-erlangen.de, Chair for Applied Mathematics I, Friedrich-Alexander University Erlangen-Nuremberg, Germany.