

# Numerical study on the modelling of macropores

Valsamidou Archontoula

## Abstract

The present study investigates the flow and transport through a heterogeneous porous medium domain. Nuclear power plants after completing their operating life are decommissioned, cleaned-up and demolished. This procedure produces waste-building rubble, which is labeled as very low level waste (VLLW), regarding its radioactivity. This waste due to its characteristics and composition (scrap metal, pipes, concrete etc.) is usually disposed in surface sanitary landfills. The heterogeneity of the materials involved forms high or low permeable lenses or even macropores. Macropores can create a network of preferential flow where contaminants from the surface can be carried to great depths in less time than considering a uniform wetting front. The aim of this study is to assess if the flow in such a domain can be studied using the standard multiphase Darcy approach or if an inertia correction should be added. The flow and transport models are simulated in DuMuX. The flow velocity is calculated through the Darcy and Forchheimer multiphase equations. Additionally, for the case of the Forchheimer flow, the inertial coefficient is calculated with two methods. Afterwards, the transport of the possible-radioactive contaminants released is simulated through tracers, and solved with an ADE considering only advective transport. The simulation results are then presented and compared on their efficiency and accuracy.