

## Image Analysis of Non-Aqueous Phase Liquid Migration in Aggregated Kaolin

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### Abstract

Double-porosity is an important feature in soil due to its influence on the migration of fluids within the soil. One of the more ubiquitous category of fluid found in the sub-surface is non-aqueous phase liquid, a type of fluid that is immiscible with water. The work in this article consists of laboratory experiments that were conducted to study the migration as well as trend of flow for non-aqueous phase liquid in double-porosity soil samples, that contained different moisture contents, using image analysis. Toluene was used as the non-aqueous phase liquid while double-porosity soil was represented by aggregated kaolin. The aggregated soil samples were placed in three-dimensional rectangular acrylic models to facilitate photographic capturing of toluene movement. Migration attributes such as area coverage, liquid saturation and optical intensity of the toluene were observed and determined through an image analysis procedure. The highest rate of toluene coverage was found in the sample with 32% moisture content, at a rate of 0.0824 cm<sup>2</sup>/s. From another aspect, the highest optical saturation value, 77.6460 luminosity, was also captured in the sample with 32% moisture content. The experimental results from the image analysis showed that the migration of the toluene will increase as the moisture content of the aggregated soil increases. In conclusion, image analysis was found to be able to assist in observing and visualizing the migration of non-aqueous phase liquids based on the saturation, intensity and area invaded in double-porosity soils.

**Key words:** Double-porosity; Image analysis; Moisture content; Non-aqueous phase liquids

Please provide a most significant figure from your work.

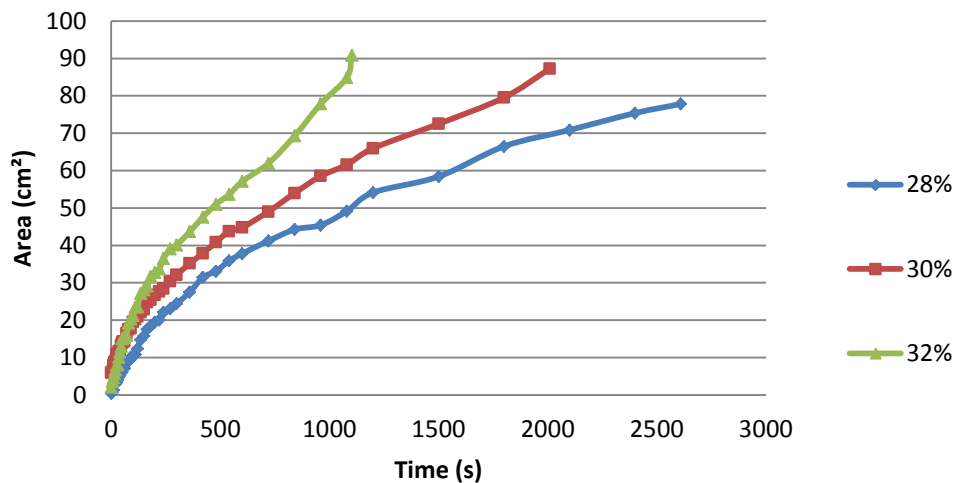


Fig. 1. Graph of NAPL coverage area versus time.