

Assessment of the unsaturated effective permeability of cementitious based materials: A comparison of two methods

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Abstract

Concrete structure durability is greatly influenced by water: water is necessary for chemical reactions to occur and can significantly impact concrete transport properties. The durability assessment of concrete structures thus necessitates an accurate description of water transport all along their service life, which can be efficiently described using a simplified approach. In this context, the description of water transport within concrete requires knowledge of several physical parameters, including the unsaturated effective permeability K_e .

Unsaturated water transport properties are very inconvenient to assess experimentally: either using Boltzmann transformation or cup-method test. That's why K_e is almost always evaluated using inverse analyses on the basis on isothermal mass variation measurements and analytical models. The literature provides data on these commonly-used methods of K_e evaluation, but no comparison between them. This study therefore focuses on two methods coherent comparison: the classical one (inverse analyses) and the cup-method test.

Keywords: water transport, durability, unsaturated effective permeability, hardened cement paste.