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The anomalous moisture transport in cementitious materials: causes and models

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The moisture condition in concretes is closely related to their durability. Liquid water is the intermedia for the penetration of aggressive agents (e.g., chloride). The empty pores provide paths for the diffusion of gases (e.g., CO2). These processes can lead to concrete deterioration or steel corrosion. Therefore, appropriate methods to determine moisture state in concrete are essential for predicating structures durability. Conventional moisture transport models are based on the Darcy's or Fick's law. However, they do not work for anomalous moisture transport, often reported for cementitious materials.
Anomalous moisture transport is caused by various reasons and we have developed different models to explain these causes. The present work summarizes the available models in the literature for anomalous moisture transport. The first type of models considers that the microstructure of cementitious materials is altered by water transport. To consider this change, a straightforward way is to use the time-dependent transport coefficient (e.g., water permeability [1–3]). The second type of models was developed by simplifying the complex pore structure as a two-porosity system, so that a dual-porosity/permeability can be applied [4]. Both types of models have been calibrated by experimental data. The other causes and potential ways to develop new moisture transport models will be also discussed in this work.

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Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Online

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