Characterization of fracture patterns and hygric properties for moisture flow modelling in cracked concrete - DTU Orbit (06/12/2018)

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Several years after their installation, building materials such as concrete present signs of ageing in the form of fractures covering a wide range of sizes, from microscopic to macroscopic cracks. All sizes of fractures can have a strong influence on heat and moisture flow in the building envelope, but their distribution is difficult to predict due to the variety of environmental factors which cause them. This paper aims at applying experimental non-destructive techniques for the observation of fracture patterns and of fluid flow in fractures, in order to provide this data to models for fluid transfer in fractured porous media. Digital Image Correlation was performed during the fracturing of concrete samples, in which moisture uptake was then monitored using X-ray radiography. Finite-element simulations were then performed based on the measurements of the fracture patterns, in order to recreate the measured moisture concentration profiles. Digital Image Correlation was found suitable as a mean to obtain a complete mapping of the deformations at the surface of the samples, and a first step was made towards the use of non-destructive fracture characterization for the purpose of moisture transfer modelling.

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