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Investigating the Use of Electrical Capacitance Tomography to Image Rapid Transient Moisture Flow Through Cracks in Concrete

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In this study, we investigate the feasibility of Electrical Capacitance Tomography (ECT) to image rapid three-dimensional (3D) moisture transport in damaged portland cement mortar and concrete. ECT is a tomography method that uses inter-electrode capacitance measurements to reconstruct the internal 3D distribution of the electrical permittivity which carries contrast with respect to moisture content. In the experimental study, ECT measurements were performed with a reservoir placed directly on the crack in each specimen to promote rapid moisture transport to test the high temporal resolution capabilities. An electrode array connected to an electrical tomography device was used to conduct moisture transport measurements in cracked specimens at a temporal resolution as high as 0.7 seconds. The results of this study illustrate that ECT can be used to detect rapid moisture transport through various crack patterns and capture the flow path of water around coarse aggregates as shown in Figure 1.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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