

Microwave Noninvasive Detection of Grout in Masonry

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Abstract:

Noninvasive detection of grout in masonry is an important issue in the construction industry. Many of the existing techniques are either destructive or not very reliable. Microwave nondestructive evaluation of Portland cement based materials has received a great deal of attention in recent years. Monitoring of the curing state in the cement paste, mortar, and concrete has been demonstrated using microwave techniques. In addition, microwave techniques have shown the potential for determining the water-to-cement ratio (w/c), sand-to-cement ratio (s/c) and the coarse aggregate-to-cement ratio (ca/c) in hardened cement paste, mortar, and concrete. In this paper, a simple near-field microwave inspection technique that utilizes an open-ended rectangular waveguide probe is used to detect empty and grouted cells in masonry blocks. The results show, with a high degree of confidence, the potential of such microwave techniques for interrogation of masonry structures. The potential of this technique for detecting partially filled grouted cells as well as cells with reinforcing bars is also discussed.

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