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Use of Tomography to Understand the Influence of Preconditioning on Carbonation tests in Cement-Based Materials

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Abstract

Recognition of the rising amount of atmospheric CO_2 has brought renewed interest in understanding the effects of carbonation on reinforced concrete performance. In laboratory testing, the specimens must be preconditioned to effectively study carbonation. This paper studied the influence of several preconditioning schemes on the carbonation profiles of cement paste specimens subjected to accelerated carbonation tests. The evolution of microstructure and moisture during carbonation were investigated accordingly. Bulk of the work was based on an extended X-ray attenuation method (XRAM), which relied on X-ray computed tomography (CT). A novel method was introduced to evaluate the extent of damage due to drying. Based on extent of damage, the paper recommends standard-cured specimens for carbonation tests as compared to water-cured specimens. Also, when comparing between oven drying and mass balancing, the latter was shown to be more suitable, as