

DURABILITY OF NSM CFRP-TO-CONCRETE BOND AFTER SIX YEARS OF EXPOSURE TO LABORATORY AND OUTDOOR ENVIRONMENTS

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ABSTRACT

The use of Carbon Fibre Reinforced Polymer (CFRP) composites as a strengthening solution for reinforced concrete structures has been widely accepted as a promising method to increase structural and durability performance; however, the durability and long-term performance of this solution still needs further research. The effect of 6 years of laboratory and outdoor exposures of CFRP-concrete bond specimens and constituent materials is investigated. Different tests (tensile tests of epoxy adhesives and CFRP laminates, concrete compression tests, and pull-out shear tests of the CFRP-concrete bond when the laminate is applied using the Near-Surface Mounted (NSM) technique) were performed on specimens collected from two laboratory environments (one with conditioning of specimens at 20 °C and 55 % RH, and the other at 20 °C in full water immersion state) and four outdoor environments (mainly to promote the effects of carbonation, elevated temperatures, freeze-thaws, and airborne chlorides). The results from the above tests for unexposed and exposed samples are presented and discussed.

KEYWORDS

Durability; ageing; epoxy adhesive; CFRP; concrete; CFRP-concrete bond; freeze-thaw; carbonation; high temperatures; chlorides.