

Reliability and Durability of FRP Materials for Rehabilitation of Concrete

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ABSTRACT

Although fiber reinforced polymer composites are increasingly used through the wet layup process for the rehabilitation of deteriorating and understrength concrete structures, there is very little validated information regarding performance over extended time periods. This has resulted in use of excessively conservative factors in design in some cases, and unconservative estimates, or complete disregard of degradation effects on some characteristics, in others. In this paper predictive approaches are used to provide estimates of long-term deterioration for a range of material characteristics which are compared to experimental data obtained over a 3 year period of exposure. It is shown that although durability of tensile characteristics is extremely good for thin sections used conventionally, the rates of deterioration increase significantly with the number of reinforcing layers used. In addition there is deterioration of other characteristics, especially related to interlaminar and intralaminar properties that need to be considered. A methodology that is capable of accounting for temperature variation during exposure is also outlined. A reliability based approach is then used to discuss selection of safety factors and to assess overall predictions.