

The effects of sulfate solution on the behavior of reinforced concrete beams

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ABSTRACT

Reinforced concrete structures can be adversely affected by chemical aggressive environments such as sulfates and chlorides. It is necessary to study the durability and some other critical engineering properties of these structures in such environments. The paper in hand reports the experimental results of sodium sulfate solution influence on the physical and mechanical properties of normal strength concrete. The experimental work included 18 reinforced concrete beams (2300×60×100 mm³). The beams loaded at the mid span following a two point loading setup. Three kinds of environments were chosen for curing the beams prior to testing: state temperature and humidity standard conditions, water basin and sodium sulfate solution. The curing environments were applied to the beams from three sides. The flexural strength and stiffness, inelastic strain in concrete, crack width and deflection were measured. The experimental results presented in this paper clearly indicate that the reinforced concrete beams exposed to sulfate solution causes a decrease the flexural strength and stiffness and an increase the width of flexural cracks.

KEYWORDS

Crack, Deflection, Stiffness, Strain, Sulfate solution
