

# Repair Technologies: Fiber Reinforced Cementitious Matrix Composites for Rehabilitation and Strengthening of Reinforced Concrete Elements

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## Abstract

Externally bonded fiber reinforced cementitious matrix (FRCM) for structural members was evaluated as a new class of composite material for repairing and strengthening of infrastructure systems. In contrast to fiber reinforced polymer (FRP) composites, FRCM composite has a superior high temperature resistance and enhanced compatibility with concrete substrates compared to more traditional FRP repair systems. This experimental investigation is evaluates the structural and durability performance of FRCM composite to be implemented in field applications. The overall experimental program consisted of: testing 12 strengthened reinforced concrete (RC) members to study the fatigue and flexure performance under environmental exposure and sustained stress, 10 strengthened RC beams to study the influence of FRCM composite in shear performance, 13 one-way RC slabs strengthened with three different composite types to evaluate their flexural performance, 30 FRCM concrete prisms to address the durability and bond performance of the FRCM composite, and 7 RC anchored-strengthened RC beams to delay the premature debonding failure of the FRCM composite under flexural loading. The experimental results demonstrated the effectiveness of FRCM composites on enhancing the fatigue, flexure, bond, and shear capacities of RC structural members. The durability performance of the FRCM composite in terms of resisting different exposure conditions such as freezing and thawing, high temperature and humidity cycles, alkaline solution, and salt solution were studied. The conclusions and summary from this research effort open the door to using FRCM composite for repairing and strengthening of RC slab decks or RC beams for bridges. This IAAM Fellow Lecture will provide a high-level overview with focused detailed results in key structural engineering aspects.

## Citation of Video Article

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