



Shear Strengthening of Concrete Structures Using FRCM Composites

Lesley H. Sneed

Ph.D., P.E., S.E., F.ACI
Professor of Civil Engineering
Department of Civil, Materials, and Environmental Engineering
University of Illinois at Chicago (UIC)

Abstract:

Fiber-reinforced composites are widely used for strengthening existing reinforced concrete (RC) structural members, offering sustainable alternatives to new construction. Cement-based mortars are being explored as a new type of binder that can replace organic matrices used in fiber-reinforced polymer (FRP) composites. Composite materials that employ cement-based mortars are referred to as fiber (or fabric) reinforced cementitious matrix (FRCM) composites. The use of inorganic matrices in FRCM composites can potentially overcome certain challenges with FRP composites such as degradation due to UV exposure, poor performance at temperatures close to or above the matrix glass transition temperature, and lack of compatibility with the substrate. This seminar will provide an overview of an ongoing investigation of the behavior of FRCM-strengthened concrete structures. First, an extensive study was conducted on FRCM-concrete joints with the goal of describing the interfacial debonding of FRCM-strengthened concrete systems. Results were used to define the idealized load response of FRCM-concrete joints and determine the load-carrying capacity of the interface, which is needed to design the strengthening system. Then, an analytical model was developed to compute the shear strength contribution of FRCM composite U-wrapped around RC beams. The proposed model accounts for the peculiar bond behavior observed in FRCM composites, which may differ significantly from that observed with FRP composites.



Bio:

Dr. Lesley Sneed is a Professor in the Department of Civil, Materials, and Environmental Engineering and the Director of the High Bay Structures Laboratory at the University of Illinois at Chicago (UIC), which she joined in 2021. Her research interests include the shear and torsional behavior of concrete structures, repair and strengthening of structures, and evaluation of existing structures, and she has co-authored more than 100 peer-reviewed publications in these areas. Dr. Sneed is a registered professional engineer in two states, a registered structural engineering in one state, and has over seven years of industry experience in structural design and rehabilitation. She is a Fellow of the American Concrete Institute (ACI), and she is currently a voting member of ACI 318, Building Code Committee, voting member of ACI/ASCE Joint Committee 445, Shear and Torsion, and incoming chair of ACI Committee 549, Thin Reinforced Cementitious Products and Ferrocement. She also serves as Associate Editor of Engineering Structures and the ASCE Journal of Composites for Construction.

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1310 Yeh Student Center