



Strengthening Design of Reinforced Concrete with FRP (Composite Materials)

By Hayder A. Rasheed

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Strengthening Design of Reinforced Concrete with FRP establishes the art and science of strengthening design of reinforced concrete with fiber-reinforced polymer (FRP) beyond the abstract nature of the design guidelines from Canada (ISIS Canada 2001), Europe (FIB Task Group 9.3 2001), and the United States (ACI 440.2R-08). Evolved from thorough class notes used to teach a graduate course at Kansas State University, this comprehensive textbook:

- Addresses material characterization, flexural strengthening of beams and slabs, shear strengthening of beams, and confinement strengthening of columns
- Discusses the installation and inspection of FRP as externally bonded (EB) or near-surface-mounted (NSM) composite systems for concrete members
- Contains shear design examples and design examples for each flexural failure mode independently, with comparisons to actual experimental capacity
- Presents innovative design aids based on ACI 440 code provisions and hand calculations for confinement design interaction diagrams of columns
- Includes extensive end-of-chapter questions, references for further study, and a solutions manual with qualifying course adoption

Delivering a detailed introduction to FRP strengthening design, **Strengthening Design of Reinforced Concrete with FRP** offers a depth of coverage ideal for senior-level undergraduate, master's-level, and doctoral-level graduate civil engineering courses.

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Editorial Review

Review

"Concrete structures are continuously exposed to environmental effect, leading to degradation of concrete and corrosion of steel. This is a worldwide problem. FRP has been increasingly used to rehabilitate and retrofit reinforced concrete structures. Although design guidelines have been developed in several countries, there is still no comprehensive textbook on strengthening concrete with FRP. Thus, this book is in time. It will benefit not only university students, but also engineering communities."

--An Chen, Department of Civil, Construction, and Environmental Engineering, Iowa State University, Ames, USA

About the Author

Hayder A. Rasheed is a professor and Thomas and Connie Paulson outstanding civil engineering faculty member at Kansas State University, Manhattan, USA. Previously, he was an assistant professor at Bradley University, Peoria, Illinois, USA. He holds a BS and MS from the University of Baghdad, Iraq, and a Ph.D from the University of Texas at Austin, USA. He is an ASCE fellow, registered professional engineer, author and co-author of 3 books and more than 50 refereed journal publications, and editorial board member of the *International Journal of Structural Stability and Dynamics* and the *Open Journal of Composite Materials*.

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