

# Fiber-Reinforced Polymer: Structural Uses in Existing and New Concrete Structures

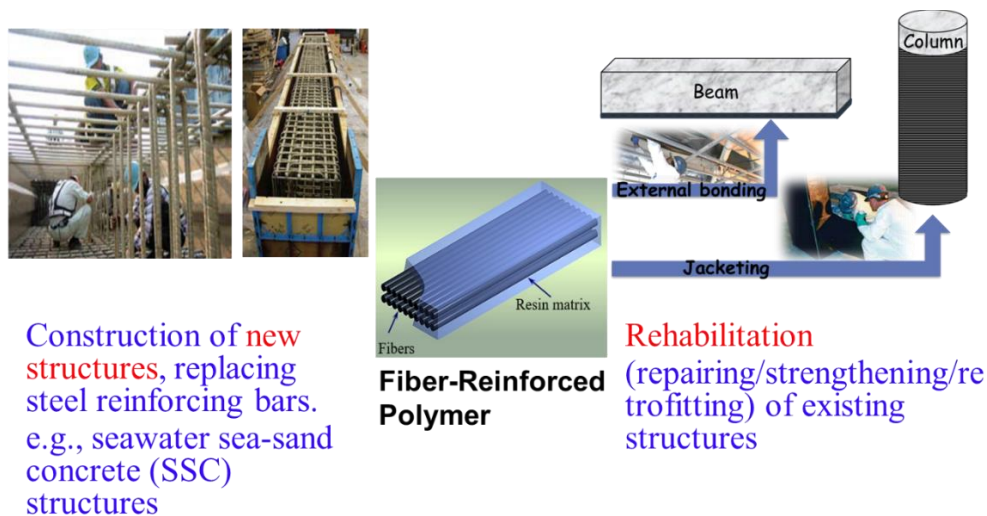
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## Graphical Abstract



## Abstract

Fiber-reinforced polymer (FRP) composites are widely used in both existing and new concrete structures. This talk will present the following research findings of the speaker on structural strengthening by FRP on the existing concrete members: (1) The quantification and improving methods on bond performance between FRP and concrete for beam strengthening; (2) Some important factors which are ignored in most existing stress-strain models of FRP-confined concrete columns. In addition, for constructing new concrete structures, FRP reinforcing bars provide a promising alternative to steel reinforcement bars as the reinforcing material for concrete structures. This is because the former are free of electro-chemical corrosion. In concrete structures where all steel reinforcement bars are replaced by FRP reinforcement bars, the compressive performance of FRP reinforcement bars, which is far inferior to their tensile performance, is of serious concern. Against this background, novel steel-free hybrid reinforcement bars have recently been proposed and studied to address this concern. Such a hybrid rebar typically consists of a central FRP bar, an external FRP confining tube and an annular layer of ultra-high-performance concrete (UHPC). This talk will report results from a recent experimental study to gain systematic understanding of the performance of these

hybrid bars. The test results confirm that the hybrid bars show excellent performance under compression and can be designed to exhibit a ductile stress-strain response.

**Keywords:** FRP; Structural rehabilitation; Composite materials.

## Biography



**Cheng Jiang** is currently a JSPS International Fellow at The University of Tokyo. He is the recipient of *Discovery Early Career Researcher Award* (DECRA) from the Australian Research Council (ARC) in 2020. Dr. Jiang received his BSc in 2011 from Southeast University, China. He completed his PhD in 2017 from City University of Hong Kong. He worked as a Visiting Scholar at Marquette University (USA) and RMIT University (Australia) from 2016 to 2017. Apart from these visits, he has many years' full-time working experiences conducting both research and consultancy activities at City University of Hong Kong (2011-2013), PolyU Technology and Consultancy Co.

Ltd (2017), and The Hong Kong Polytechnic University (2017-2020). His research involves composite materials and structures, and structural rehabilitation. Dr. Jiang has authored more than 60 technical works, including 34 SCI-indexed journal papers and 1 authored book. The published papers of Dr. Jiang have been cited more than 1100 times with h-index of 16 (google scholar, Sep 2021). As a PI, Dr. Jiang has obtained more than USD \$300,000 grants in total from Australian, Japanese, Hong Kong and Chinese national/regional research councils.

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