

## Advancement of FRP composites and structural innovation

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Aside from structural repairing and retrofitting, fiber-reinforced polymers (FRP) composites have been gradually developed as advanced structural materials to achieve high performance and longevity in new construction. However, due to insufficient evaluation on service life of FRP for construction under various conditions and the lacking of key technologies and innovative applications, the applications of FRP in construction are still limited. Focusing on above limitations, the authors' team have conducted a series of innovative researches in the past ten years on developing advanced basalt FRP composites and various stable composite products, proposing evaluation methods of short- and long-term behavior of FRP, as well as enhancing FRP integrated behavior through hybridization, matrix modification, pretension treatment and intelligence technology. Based on above advancement of FRP composites, a series of innovative applications and key technologies of FRP in new construction were developed, comprising durable concrete structures reinforced with both FRP and steel reinforcing bars, prestressed FRP tendons, FRP grids, damage controllable and recoverable seismic structures with hybrid FRP and steel bars, lightweight and longevity of long-span bridges with various FRP cables and composite FRP-concrete deck system, and intelligent structures with FRP smart bars. Based on above breakthrough in both FRP materials and structural application technologies, the authors suggest that deeper understanding and comprehensive evaluation of FRP's behavior according to structural needs are necessary. Meanwhile, performing FRP advantages through multi types of FRP composites, hybridization with conventional materials, prestressing technologies and intelligent FRP are the key issues to push forward successful applications of FRP in major engineering structures.

## Short Biography

Zhishen WU is a professor at Southeast University in China and Ibaraki University in Japan. He received BS and MS from Southeast University, in 1983 and 1986 respectively and his PhD from Nagoya University, Japan in 1990. His research interests include FRP composite technologies, advanced basalt fibers, sensor technologies, structural health/risk/disaster monitoring, control and management, and sustainable infrastructure. He has published 8 books and over 600 papers in refereed journals and international conference proceedings including over 60 keynote or invited papers, among which over 150 journal papers and 30 keynote or invited papers are related to FRP. He also holds over 60 authorized patents. Although about half of his research papers have been published in Japanese or Chinese journals, his publications in English have also received wide citations, e.g. his total citation in Scopus is over 4000 times. He was awarded the JSCE Research Award by the Japan Society of Civil Engineering in 1990, the JSCM Technology Award from the Japan Society for Composite Materials in 2005, and 2009 SHM Person of the Year Award from the International Journal of Structural Health Monitoring and related organizations, National Prize for Progress in Science and Technology of China in 2012 and IIFC medal from International Institute of FRP in Construction in 2016 etc.

He has been the committee chairman or board member of numerous national and international scientific societies such as the chairman of China chemical fibers association committee on basalt fibers, the president of International Society for Structural Health Monitoring of Intelligent Infrastructures (ISHMII). Moreover, he serves as an editor, associate editor, editorial board member for more than ten international journals, including the founding Editor-in-Chief of the International of Sustainable Materials and Structural Systems. He is an elected Fellow of ASCE, JSCE, IIFC, ISHMII etc.