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Shear behaviours of HB-FRP strengthened concrete beams

Biao Hu[1,2], **Xiaowei Wang**[1,2], **Feng Xing**[1,2], **Lili Sui**[1,2], **Dawang Li**[1,2] and **Yingwu Zhou**[1,2]
[1]Guangdong Provincial Key Laboratory of Durability for Maine Civil Engineering, Shenzhen University, China
[2]Department of Civil Engineering, Shenzhen University, China

The externally bonded (EB) fiber reinforced polymer (FRP) strengthening technique has become a popular method for improving the structural performance of infrastructures, in which U-wrapping FRP is one of the most popular choices for shear strengthening of reinforced concrete (RC) beams. However, the debonding of EB-FRP U-strips in shear span is the major failure mode, which results in a fracture failure mode with low efficiency of using FRP material. The paper presents an experimental study to investigate the performance of a hybrid bonding (HB) FRP system with mechanical anchors under different targeted vertical pressure levels for shear strengthening of RC beams. The performance of EB- and HB-FRP strengthened beams was compared in terms of the detailed failure process, failure mode, load-deflection response and strain levels in FRP U-strips. Tests results indicate that, compared with EB-FRP system, HB-FRP strengthened beams showed a larger shear capacity and more effective using of FRP material, and that such superiority will be more significant when increasing the vertical pressure applied on anchors. A modified shear strength model considering the mechanical anchor applied on FRP strips was then proposed.

Biography

Biao Hu is currently a research associate fellow in the College of Civil Engineering at Shenzhen University, China. He completed his PhD in 2017 from City University of Hong Kong. His research interests involve concrete structures, structural rehabilitation/strengthening by FRP composites, and steel structures. Dr. Hu is accurately a reviewer for several SCI journals, including Journal of Structural Engineering ASCE, International Journal of Geomechanics ASCE, Materials and Structures, and Thin-walled Structures. Dr. Hu has received the 2018 Moisseiff Award from American Society of Civil Engineers (ASCE).

biaohu3-c@szu.edu.cn

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