

5th International Conference on

STEEL AND CONCRETE STRUCTURES

August 29-30, 2018 Tokyo, Japan

Experimental study on fatigue performance of orthotropic bridge decks strengthened by using FRP angles

Jie Liu, Tong Guo and Zhongxiang Liu
Southeast University, China

The progressive fatigue damage is a common problem for civil infrastructures, such as steel and composite bridges. Under the low-amplitude but repetitive loading, fatigue cracking may often develop in welded bridge decks, resulting in severe damage and considerable maintenance or repair costs. During the past decades, various fatigue repair methods have been proposed and implemented, including the hole drilling, grinding, re-welding, welded steel plates and post-weld treatments. This paper presents the fatigue test results of seven welded orthotropic bridge decks under pure bending, five of which were strengthened by using the externally bonded Fiber Reinforced Polymer (FRP). The influence of different materials of FRP, i.e. Glass Fiber Reinforced Polymer (GFRP) and Carbon Fiber Reinforced Polymer (CFRP), different adhesives, i.e. Epoxy Resin (ER) and Acrylates (AC) and different dimensions of the angles, on the fatigue life of strengthened decks are experimentally investigated. According to the stress measurements and fatigue life testing, the externally bonded FRP angles can significantly elongate the fatigue lives and longest one may be up to 4.2 times that of the original life. In all tests of strengthened decks, cracks initiated from the deck-FRP interface, resulting in the de-bonding of the angle, followed by the final failure of the decks. Under the same circumstances, the AC adhesive is found to be more appropriate than the ER due to its longer fatigue life and easier construction. Based on the presented work, suggestions for the design of fatigue strengthening of orthotropic bridge decks are given.

Biography

Jie Liu is a PhD Candidate in Southeast University, Nanjing, China and his research topic is fatigue reinforcement of steel bridges by FRP. Based on his research topic, he made a series of related experiments and field strain measurement of orthotropic steel decks and has achieved several test results.

jieliu@outlook.com

Notes: