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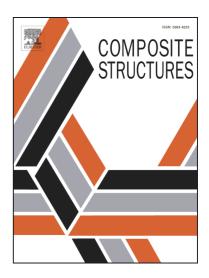
PII: S0263-8223(17)33830-8

DOI: https://doi.org/10.1016/j.compstruct.2018.05.110

Reference: COST 9749

To appear in: Composite Structures

Received Date: 9 November 2017 Revised Date: 20 March 2018 Accepted Date: 18 May 2018



Please cite this article as: Jiang, S., Yao, W., Chen, J., Tao, S., Time dependent behavior of FRP-strengthened RC beams subjected to preload: Experimental study and finite element modeling, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.05.110

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Title Page

Time dependent behavior of FRP-strengthened RC beams subjected to preload: Experimental study and finite element modeling

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Abstract: This paper deals with the influence of preload and FRP stress-lagging on the time dependent behaviors of strengthened concrete beams. For this purpose, three concrete beams were fabricated: one (B1) strengthened directly without any preload; one (B2) preloaded, fully unloaded and then strengthened; one (B3) preloaded by the same value of force as B2, but strengthened with the preload remaining. Sustained loads were applied to test beams and their deformations and cracking patterns were recorded for comparison. According to the test results, B1 presented the largest long-term deformation with the most evident crack propagation in load sustained period, followed by B2 and B3. Accordingly, non-linear finite element (FE) analyses were performed. The validity and accuracy of the FE models were demonstrated by comparing theoretical and experimental results. The effect of adhesive creep was also investigated on the basis of the proposed FE approach. It could be concluded that adequate development of cracks before sustaining loads may have positive influence on better controlling the long-term deformations, while higher level of shear stress in bonding interfaces may present negative effects.

Keywords: Sustained load; Concrete beam; FRP; Stress-lagging; Cracking pattern

Acknowledgement

This study was financially supported by the Chongqing Science and Technology Committee, China [grant numbers: cstc2015shmszx30006, cstc2011ab0043].

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