Bamboo Fibers Composite – A Novel Material for Structural Strengthening

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ABSTRACT

Fiber reinforced polymer (FRP) is widely used in the construction industry for structural strengthening due to their outstanding mechanical properties. However, the production of synthetic fibers such as FRP is detrimental to the environment. Alternatively, natural fibers composite may be used as external strengthening material. This paper presents the potential of bamboo fiber composite plate (BFCP) to strengthen the reinforced concrete (RC) beams in flexure. The bamboo of species Dendrocalamus asper was used to produce the fiber and fiber-to-volume ratio was set at 2:5. The composite plate and RC was bonded with epoxy using a hand-lay-up method. The flexural and tensile strength of the BFCP was measured and all the beams were tested to failure under four-point bending test. It was found that BFCP exhibited a higher flexural and tensile strength compared to pure epoxy samples. Meanwhile, the RC beams strengthened using BFCP exhibited an increment of 10-12% in beam structural capacity compared to the un-strengthened beams. Bonding of BFCP in the flexure zone was able to divert the vertical cracks into diagonal at the edge of the composite plate. Findings from this work may serve as a useful guide to strengthen RC beams using a BFCP.

KEYWORDS

Bamboo fiber composite, reinforced concrete beams, natural fibers, strengthening, structural, flexure

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