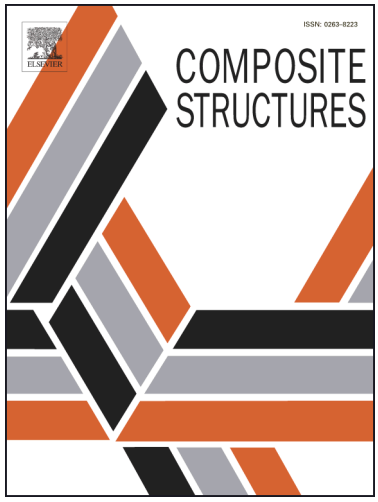

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EFFECT OF LOAD DISTRIBUTION ON IC DEBONDING IN FRP-STRENGTHENED RC BEAMS: FULL-SCALE EXPERIMENTS

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ABSTRACT

This paper presents an experimental study into the effect of load distribution on intermediate crack (IC) debonding in FRP-strengthened RC beams, an issue which has received very limited attention so far. Five large-scale FRP-plated RC beams were tested in two series to investigate the effects of shear span and load uniformity on IC debonding respectively. The tests indicated that increasing the load uniformity and shortening the shear span both had a beneficial effect on the maximum moment in the beam (i.e., mid-span moment) at IC debonding failure, and they led to an increase in the mid-span moment by up to 18.5%. The test results were next used to assess the accuracy of two existing IC debonding strength models which are applicable to different load distributions. The assessment results show that one of the approaches is rather conservative while the other approach significantly over-predicts the effect of load distribution.

Keywords: FRP; flexural strengthening; concrete beam; debonding; load distribution; arching action.

INTRODUCTION

The external bonding of a fibre reinforced polymer (FRP) plate to the soffit of a reinforced concrete (RC) beam (i.e., FRP-plated RC beam) is now a widely used technique for upgrading the flexural performance of RC beams (Teng et al. 2002;