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STRUCTURAL PERFORMANCE OF CONCRETE FILLED FRP THIN WALLED TUBULAR BEAMS

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ABSTRACT

Corrosion of steel reinforcement in concrete is considered to be the major cause of deterioration in civil infrastructure facilities. The use of fibre-reinforced polymer (FRP) tubes acts as a structurally integrated stay-in-place form for concrete members that expand the service life of structures, enhancing the corrosion resistance and potentially high durability. This paper presents on an experimental study on the structural performance of normal and high strength of concrete infilled FRP thin walled tubular beams with different configurations. The concrete filled FRP thin walled tubular beams showed an increase in ultimate load carrying capacity, stiffness and ductility.

Keywords: FRP tubular beams; HSC; NSC; thin walled; woven roving; unidirectional

1. INTRODUCTION

The corrosion of steel reinforcement in reinforced concrete structures causes continual degradation to the worldwide infrastructures [1, 2, 3]. In recent years, fibre reinforced polymer (FRP) composites have found extensive applications in civil engineering, both in retrofit of existing structures and in new construction [4,5,6,7,8]. FRP composites possess several advantages over steel, including high strength to weight ratio and good corrosion resistance. To effectively utilize the advantages of FRP material, innovative structural systems are needed which either incorporate composite-efficient forms or which combine these new materials with conventional ones. The FRP tubes employed as structurally integrated stay-in-place forms for concrete structural members such as

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