ADVANCED COMPOSITE MATERIALS IN BRIDGES AND STRUCTURES
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MATÉRIAUX COMPOSITES D'AVANT-GARDE POUR PONTS ET CHARPENTES
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EVALUATION OF SERVICE LOAD DEFLECTION FOR BEAMS REINFORCED BY GFRP BARS

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ABSTRACT

This paper investigates the suitability of using the currently practiced ACI model to predict the deflection at service load for beams reinforced by glass fiber reinforced plastic (GFRP) bars. It also investigates the suitability of using some modified models available in the literature to predict the deflection for those beams. To explore that, a test program consisted of fifteen beams categorized into five groups is conducted. Measured deflections at midspan of the beams for the five groups were analyzed and compared with the corresponding predicted values using the ACI model and those models available in the literature.

INTRODUCTION

Recently fiber reinforced plastic (FRP) materials have shown a great potential for use in civil engineering applications because they have high strength to weight ratio, high resistance to corrosion and they are non magnetic. Unfortunately, the engineering characteristics of FRP materials are different from those of steel. Consequently, the currently available design formulas for concrete elements reinforced with steel bars may not be used with concrete elements reinforced with FRP bars. There is, however, an enormous research effort to either develop new design formulas or adopt the currently used ones to account for the properties of FRP bars. Some of these formulas have already been suggested and available in the literature. It is, however, useful to investigate the accuracy of these models before they can be used by practitioners for field applications.

The work presented in this paper presents the results of the experimental study that was carried out to check the validity of using the currently practiced ACI-Code (1992) model to predict the deflection at service load for beams reinforced by glass fiber reinforced plastics