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STUDY OF SHORT COLUMNS CONFINED CONCRETE

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ABSTRACT

The confinement of concrete structures has been used in strengthening and rehabilitation of compressed pieces, with the goal of increasing their strength capacity and ductility. Various types of reinforcement are used: metal tubes, fiber reinforced polymers, transverse reinforcement, among others. This paper presents a study of the behavior of short columns confined submitted the load-centric, employing a nonlinear theoretical model which allows to obtain the stress-strain curves. Concrete of varying strengths and forms is considered, confined with transverse reinforcement and composites. To verify the performance of the model is being carried out a comparative analysis considering the experimental results from several examples of confined columns available in the literature, validating the mathematical models and numerical strategies used.

Keywords: columns of concrete, fiber reinforced polymers, transverse reinforcement, confinement.

INTRODUCTION

The construction is in development constant and search for new technologies, new procedures have used for reinforcement of concrete structures. In addition to using the steel to confine the concrete core with transverse reinforcement, is also being used composite materials. The confinement improves the performance of the pillars, it provides an increased strength capacity in relation to the axial load, and moreover, there is also an increase in the ductility of the system. Studies that analyze the behavior of such structures have been developed and models have been proposed to simulate their behavior, but these models use different parameters and there are considerable differences between the results obtained. Knowing the behavior of confined concrete is very important to be able to evaluate the reserve strength of elements subjected to unforeseen overloads and dimension reinforcement of pillars where necessary.

RESULTS AND CONCLUSIONS

The model Marques et al. (2004) was adapted with suitable formulations for calculating the lateral pressure and axial load. The proposal has been modified for different numerical expressions suggested by other authors for calculating the maximum stress and deformation confined concrete and subsequently the stress-strain graph was generated and compared to graphics available in the literature. Some graphs are shown in Fig.1 and 2.

The conclusions indicate that more comparative studies are needed to identify and develop the most appropriate formulation, in order to better describe the behavior of confined columns, considering the wide variety of possible conditions, such as: characteristics of materials (concrete, fiber composite glass or carbon, reinforcing steel), composite jacket thickness and spacing of the stirrups. Therefore verify the validity of existing models require extensive analysis and this is a very important study.

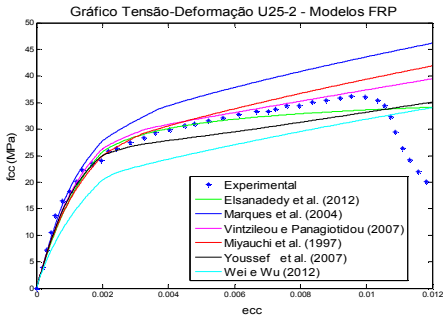

Fig. 1 - Curve obtained for circular column confined with FRP and steel and experimental values of Demers and Neale (1999).

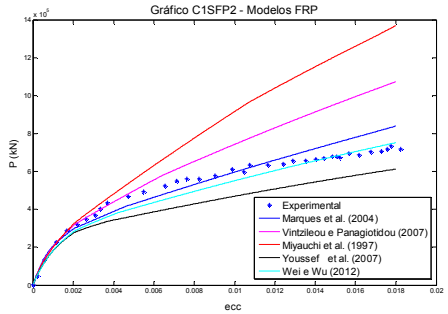

Fig. 2 - Curve obtained for rectangular column confined with FRP and steel and experimental values of Hantouche (2005).

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