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STRESS- STRAIN RELATIONSHIP FOR THE CONFINED CONCRETE

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The mechanical behaviour of the confined concrete is characterized by the increase in strength and ductility. The magnitude of the increase is established by various confinement parameters such as the compressive strength of the concrete, the volumetric, the diameter and the configuration and the strength of the ties, the ration and the diameter of the longitudinal bars and the section geometry. There have been many attempts to describe the stress-strain relation of confined concrete. Sheikh and Yeh [1] made analytical and experimental studies on the mechanism of confined. They introduced the concept of the effectively confined concrete area and presented the stress-strain relations of confined concrete. Mander and al. [2] proposed a stress-strain relation of confined concrete with according the confinement effects to the various configurations of lateral ties. Park and al. [3] proposed a modified stress-strain relation. Heo-Soo and al. [4] proposed a stress-strain curve of laterally confined concrete with according the confinement effects to various parameters. But all these models are limited by transverse steel percentages.

The objective of this study is to present a numerical analysis of circular and rectangular sections reinforced with longitudinal and transversal bars. In this case, a stress-strain relation of confined concrete is proposed. For the purpose of investigating confinement effect, an effectively confined ratio was introduced. It takes into account the effects according to concrete compressive strength, the ratio, the diameter and the configuration of the transversal bars, the diameter and the ratio of the longitudinal bars and sections geometry. This study provides an empirical stress-strain equation to determine the concrete strength until the peak stress. After the peak stress, two empirical stress-strain equations are proposed for describe the confined concrete behaviour in this case. The simplicity of the model, made up of three relations to describe the behaviour of confined concrete, permit it uses easily on various calculation methods. The comparisons with experimental stress-strain curves obtained by Mander and al [2] permit to establish the validity of the proposed model. Figures 1 to 4 illustrate the validity of the proposed model for circular (Fig. 1 and 2) and rectangular sections (Fig. 3 and 4).
In the case of circular sections, the model gives good results for transverse steel percentages ranging from 1 to 2.5%. There is a difference between the calculated curve and the experimental curve in the post peak for a small percentage (0.6%) steel cross. By cons for rectangular sections, the results are quite satisfactory confrontation and to percentages ranging from 2.41 to 7.91%. Looking ahead, we could estimate the contribution ductility structures railing posts - beams subjected to horizontal forces due to earthquake taking into account the

real and effective confining of nodes and therefore better estimate the vulnerability of such structures.

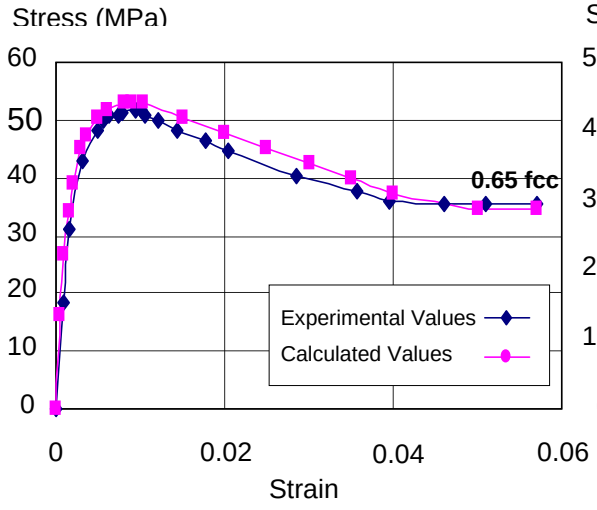

Figure 1: Comparison of experimental and theoretical stress-strain curve (test N° 1)

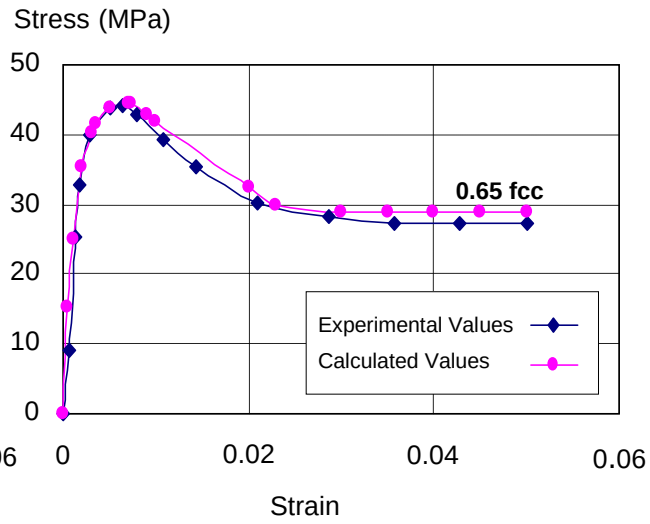

Figure 2: Comparison of experimental and theoretical stress-strain curve (test N° 2)

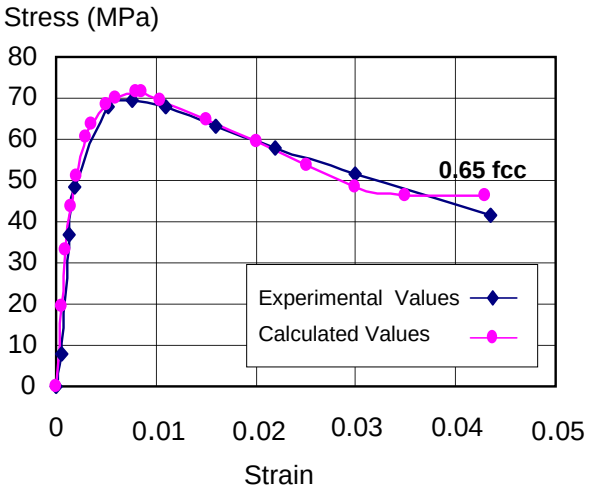

Figure 3: Comparison of experimental and theoretical Stress-Strain curve (test N° 10)

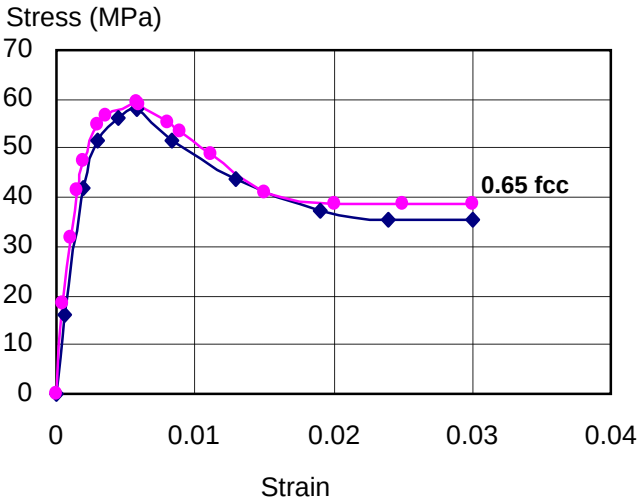

Figure 4: Comparison of experimental and theoretical Stress-Strain curve (test N° 11)

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