

International CRP 2022—Category B

Lateral resistance of vertical structural elements in relation to confinement characteristics

Project Coordinator Name: Marina L. Moretti (National Technical University of Athens)

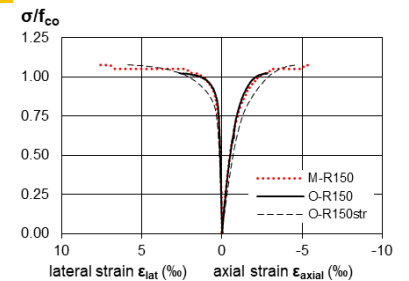
MSL Faculties: Susumu Kono

- Aims of Research -

This project aimed to study the effect of the layout of transverse reinforcement, both in-height and in-plan of the cross-section to the axial resistance of reinforced concrete (RC) columns. In order to study the importance of both factors, 1/3 scaled short RC columns with round and square cross sections, and two different ratios of stirrup spacing (s) -to-rebar diameter (d): specimens M- s/d=7.6, typical of modern code principles, and specimens O- s/d=11.7, typical of older structures. RC columns were subjected to axial compression until failure.

- Results -

In this experimental study a single stirrup was used in the cross-section perimeter. The tests verified the reduced confining capacity of transverse reinforcement in case of rectangular section, as compared to round sections. Lateral resistance of vertical RC elements with inappropriate transverse reinforcement reduces because of the occurrence of buckling of the longitudinal rebars. For the parameters of this experimental study, it was observed that RC columns with spacing of stirrups s/d~8 as compared to s/d~12, show only slight increase of ultimate axial strength of about 5-10%, but considerable increase in strains at failure, amounting to 50-100%. The increase in axial strength is more evident in square sections, while the increase in strains is more evident in round sections. The presence of one layer of CFRP jacket for the columns with sparsely spaced stirrups resulted up to 85% increase in axial strength and more than 500% increase in the corresponding ultimate strains, and hence ductility.



(a) stress-strain curves for RC short columns



(b) square section



(c) square section