

Review on Effect of Confinement on Rectangular Column

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Abstract

In this paper presents a comparative investigation based on various types of effective confining material, like (stapled stirrups, WWM, welded spot stirrups, ferrocement, FRP). The transverse reinforcement plays an important role in the ductility of the column. The preparedness for the formation of the plastic hinges in column, it requires confinement of concrete by transverse reinforcement. To study the effectiveness of the Confinement reinforcement, its quantity, working out the optimum combination of the confinement reinforcement and also the load carrying capacity of the rectangular column. The study of rectangular column is significant as it is used mostly in the practical building construction. This project is high lighting the study of “study the different types of effective confining material on RC rectangular column” by improving the confining quality. It also adds the different properties of reinforced concrete column.

Keywords: WWM, FRP, Confinement

I. INTRODUCTION

Columns are more important structural element in any structure that transfers the entire loads to the foundation because of this it is necessary to confined column with external confining material. It improves the properties of concrete by confining it. In most of the damaged structures it can be seen that in several failure of the entire structure was occurred by the failure of columns by chain action. Traditional steel ties reinforcement cannot provide better confinement for reinforced concrete (RC) column, due to the spacing between two ties and disturbance of concrete continuity. Since, effectiveness of the design approach involving strong column weak beam concept is still controversial matter, it will be dangerous to design the structures without considering the formation of plastic hinges in columns. It is taken into consideration the failure of structures due to sudden loading like earthquake, flood attack and consequently the loss of lives, the design on the premise that plastic hinge may occur in the column may be eventually more economical, even though the initial cost of detailing will be higher. There are two ways for confinement:

- Global retrofitting
- Local retrofitting

By the provision of the confinement reinforcement the area of the confined core increases. By the provision of the transverse reinforcement in the column in the form of spirals, cross ties etc, the area of confined core achieved is insufficient to dissipate the earthquake induced inertial forces. So it is necessary to provide extra reinforcement than the nominal.

II. LITERATURE REVIEW

Ahmed et.al. (2015) studied the square column specimens confined with welded wire mesh material. In single layer of confinement increase the ultimate load capacities with 11.02% and 18.55% for slenderness ratio 7 and 14. Wrapping with WWM increase the energy dissipation with 85.36% and 450.80% for slenderness ratio 7 & 14. By confining EMM layer provide 80% reduction in ties volumetric ratio. With the confinement the column specimens failed in a ductile manner as compared to brittle failure of specimen.

Mourad et.al. (2012) studied the column specimens for the ultimate load capacity and stressed samples confined with ferrocement using welded wire mesh as the confining material. In case of pre-stressed specimens, the results showed that the confining increased the load carrying capacity to 33%. Ductility of the specimens also increased. In case of stressed samples to a value of 60% and 80% of the ultimate load capacity, the confinement enhanced the ultimate load capacity to 28% and 15% respectively. With the confinement the column specimens failed in a ductile manner.

Kaish et.al. (2012) studied the effect of ferrocement jacketing with some modifications. Three types of ferrocement jacketing techniques were used to confine the column specimens that are; square jacketing with single layer wire mesh and rounded column corners (RSL); square jacketing using single layer wire mesh with shear keys at the centre of each face of column (SKSL) and

square jacketing with single layer wire mesh and two extra layers mesh at each corner (SLTL) are considered for this purpose. The specimens were tested under concentric and eccentric modes of loading. These methods of confinement significantly improved the ultimate load capacity, axial deflection and lateral deflections. This report concluded that improved square ferrocement jacketing schemes introduced in this study are effective to overcome the drawbacks of conventional square ferrocement jacketing of square RC column and could be used effectively for re-strengthening of square RC column subjected to both concentric and eccentric loadings after taking proper care in jacketing schemes.

Xiong et.al. (2011) studied the load carrying capacity and ductility of circular concrete columns confined by ferrocement including steel bars (FS) where they are proposed to increase the compressive strength along with the ductility. The behaviour of the ferrocement strengthened columns was compared with the bar mat-mortar (BS) and fibre reinforced polymer (FRP) wrapped columns under uniaxial compression. The dimensions of the concrete cylindrical columns were, 105 mm (dia) x 450mm and 150 mm (dia) x 450mm. After wet-curing (24 hrs), the samples were transferred to curing room for 27 days. The specimens with 105 mm (dia) were confined with FS or BS whereas 150mm (dia) with FRP. The comparative analyses of these samples show that the compressive strength of FS columns was enhanced by 30% than that of BS columns. Due to ferrocement caging along with steel bars specimens showed higher ductility, compressive strength and energy absorbing capacity than BS or FRP strengthened circular columns.

Turgay et.al. (2010) studied the effect and failure mechanisms of large-scale square/ rectangular columns wrapped with fibre reinforced polymer (FRP). The experimental research program studied the performance of large-scale square RC columns wrapped with carbon fibre reinforced polymer (CFRP) sheets. Moreover, the research was mainly focused on the investigation of the total effect of longitudinal and transverse reinforcement and FRP jackets on the behaviour of concentrically loaded columns. All the specimens were subjected to monotonically increasing compression up to the fracture. Fully wrapped specimens with a slenderness ratio of 5:1 fractured at the top or bottom quarters whereas the partially wrapped columns show failure at the ends of confined regions. The partial wrapping with one-layer of CFRP results an increase in ductility and this is much more pronounced for RC columns with eight longitudinal bars. Finally, for all RC columns fully wrapped with one layer of CFRP, transverse reinforcement with a diameter of 12 mm clearly enhances the beneficial effect of CFRP on ductility.

III. CONCLUSION

Most of the researchers have done work on circular and square shape column transverse confinement reinforcement. In this paper a practically relevant Rectangular column is considered having different types of confinement reinforcement.

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