



Retrofitting -Comparative Study of RC Jacketing and FRP Wrapping

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ABSTRACT

Structures get dilapidated with time for which repairs is not feasible. Some structures cannot be kept closed for longer downtime required for reconstruction. Retrofitting is the efficient method which can be adopted to combat all these defiance. This article appends comparative study of percentage increase in strength after adopting RC jacketing and FRP wrapping. Percentage increase in strength achieved after RC jacketing and FRP wrapping is determined and compared. This study is fruitful to gauge suitability of the two retrofitting methods for weakened structural members. The study will be handy to help the structural engineer to decide which method of retrofitting should be adopted for acquiring the required increase in strength.

Key words: Confinement, Ductility, FRP wrapping, RC jacketing, Retrofitting, Seismic Performance

INTRODUCTION

The existing deficient buildings be retrofitted to improve their performance in the event of an earthquake and to avoid large scale The strengthening and enhancement of the performance of deficient structural elements or the structure as a whole is referred to as retrofitting. Retrofitting aims at structural strengthening of a building after or before an earthquake to a predefined performance. The seismic performance of a retrofitted building is superior to that of the original building. It is, therefore, recommended damage to life and property (17).

Need of retrofitting

Complete reconstruction would be a costly affair. The entire rehabilitation (redevelopment) of building would cost much higher than the retrofitting cost. Historic monuments have to be maintained in their original design with safety.

Methods of retrofitting

There are numerous methods of retrofitting available. Moreover there are a few upcoming methods of retrofitting as well. But tht preferable, efficient and practiced methods are RC Jacketing and FRP Wrapping.

LITERATURE

In an experimental study, tries to investigate the properties and behavior of the jacketed columns and the effect of height of the jacket while the original columns were under loading. Six parameters affecting the behavior of strengthening RC columns were studied; jacket thickness, the stress level in the original column, concrete strength of the original column, stirrups of the jacket, shear connectors, and jacket height, respectively. The tested specimens divided into six groups; each group concerned with one of the mentioned six parameters. The following points concluded:

- As the preloading stress in the original column increases the ultimate load of the jacketed column decreases by different percent as (19%, 31%, and 42%) for the method of preloading by the working load, 0.5 of the failure load, and 0.8 of the failure load respectively.
- Vertical strains in the jacket decrease as the stress level increases in the original column, which means that jacket efficiency decreases as the stress level increases.
- The lateral tensile strains at the top of the jacket increases as the stress level in the original column increases after the first crack load.
- In the case of the preloaded columns, the vertical strain at the top of the jacket is less than in the case of the total release of load. While for preloaded columns, the vertical strain in the original columns is more than that in the case of the complete release of load at the ultimate load. The Calculation of the strength of the jacket as a RC column overestimates the strength. The overestimation increases in the case of preloaded columns over the cases of the total release of load.
- In the case of loading the original column and the jacket for the preloaded columns, the ultimate load increased by 1.81 times the ultimate load for loading the original column only.
- In the case of the total release of load, the ultimate load increased by 2.05 times the ultimate load for loading the original column only.

Columns Jacketed on four faces

- The jacketing for strengthening resulted in a column capacity of 92% of the reference (monolithic) specimens.
- There is no reduction in stiffness and ductility; only the axial load capacity is reduced by 8%.
- The jacketing for rehabilitation (repairing) has resulted in a column capacity of 88% of the reference (monolithic) specimens.

Columns Jacketed on three faces

- The jacketing for strengthening and rehabilitation (repairing) resulted in a column capacity of 90% and 82%, respectively, of the reference (monolithic) specimens.
- Column stiffness has increased by 40% in repairing specimens and 51% in rehabilitation (monolithic) specimens.
- The strengthened column has dissipated 14% less energy, and the repaired column 23% less energy as compared to the monolithic column. Jacketing on all four faces is more efficient from the strength and ductility points of view as compared to jacketing on three faces only.

CONCLUSION

This article is fruitful to gauge suitability of the two retrofitting methods for weakened structural members. The study will be handy to decide which method of retrofitting should be adopted for acquiring the required increase in strength. Comparative study of percentage increase in strength depicted clearly that RC jacketing exhibits higher percentage of increase in strength than FRP wrapping.

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