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Cost-Effective Strengthening Methodology For RCC Buildings by Jacketing Against Failure Due to Earthquake: A Study

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Abstract

Modern infrastructure management against failure due to unaccounted forces like earthquake forces is a great need in the society due to high cost and structural strengthening can help them last longer and be more resilient to earthquake. In general, structures are severely affected by earthquake loads. Strengthening by Jacketing technique can be effective in protecting reinforced concrete structures while simultaneously prolonging their life. Literature survey reveals a good number of studies have been performed in the past but effective strengthening methodology for RCC buildings by jacketing against failure due to earthquake is not available in Indian perspective. The purpose of this study is to compare on jacketing procedures such as concrete jacketing, steel jacketing, and Carbon fiber-reinforced polymer (CFRP) jacketing, combinations of different jacketing methods through numerical investigation using Finite Element Analysis (FEA) software i.e., ABAQUS due to real type earthquake ground motion. it was discovered that concrete jacketing is a viable alternative for use in low rise buildings, as it decreases 11.83% of deflection globally. The optimal combination of concrete jacketing at ground floor columns and CFRP at joints reduces global deflection by 28.69% when compared to the reference structures. It was observed that concrete jacketing is the most cost-effective option for low-rise buildings, accounting for only 6.55% of the overall building cost when only material costs are considered. The cost of combining concrete and CFRP is also lower, accounting for only 19.83% of the total cost.

Keywords: Strengthening, Concrete jacketing, Steel jacketing, FRP jacketing, FEA, Earthquake, RCC building