

## Strengthening of Reinforced Concrete Columns Using Advanced Composite Materials to Resist Earthquakes

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**Abstract :** Recent earthquakes have demonstrated the vulnerability of older reinforced concrete buildings to fail under imposed seismic loads. Accordingly, the need to strengthen existing reinforced concrete structures, mainly columns, to resist high seismic loads has increased. Conventional strengthening techniques such as using steel plates, steel angles and concrete overlay are used to achieve the required increase in strength or ductility. However, techniques using advanced composite materials are established. The column's splice zone is the most critical zone that failed under seismic loads. There are three types of splice zone failure that can be observed under seismic action, namely, Failure of the flexural plastic hinge region, shear failure and failure due to short lap splice. A lapped splice transfers the force from one bar to another through the concrete surrounding both bars. At any point along the splice, force is transferred from one bar by a bond to the surrounding concrete and also by a bond to the other bar of the pair forming the splice. The integrity of the lap splice depends on the development of adequate bond length. The R.C. columns built in seismic regions are expected to undergo a large number of inelastic deformation cycles while maintaining the overall strength and stability of the structure. This can be ensured by proper confinement of the concrete core. The last type of failure is focused in this research. There are insufficient studies that address the problem of strengthening existing reinforced concrete columns at splice zone through confinement with "advanced composite materials". Accordingly, more investigation regarding the seismic behavior of strengthened reinforced concrete columns using the new generation of composite materials such as (Carbon fiber polymer), (Glass fiber polymer), (Armiad fiber polymer).

**Keywords :** strengthening, columns, advanced composite materials, earthquakes

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