

## Effect of Storey Number on Vierendeel Action in Progressive Collapse of RC Frames

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**Abstract :** The progressive collapse of reinforced concrete (RC) structures will cause huge casualties and property losses. Therefore, it is necessary to evaluate the ability of structures against progressive collapse accurately. This paper numerically investigated the effect of storey number on the mechanism and quantitative contribution of the Vierendeel action (VA) in progressive collapse under corner column removal scenario. First, finite element (FE) models of multi-storey RC frame structures were developed using LS-DYNA. Then, the accuracy of the modeling technique was validated by test results conducted by the authors. Last, the validated FE models were applied to investigate the structural behavior of the RC frames with different storey numbers from one to six storeys. Results found the multi-storey substructure formed additional plastic hinges at the beam ends near the corner column in the second to top storeys, and at the lower end of the corner column in the first storey. The average ultimate resistance of each storey of the multi-storey substructures were increased by 14.0% to 18.5% compared with that of the single-storey substructure experiencing no VA. The contribution of VA to the ultimate resistance was decreased with the increase of the storey number.

**Keywords :** progressive collapse, reinforced concrete structure, storey number, Vierendeel action

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