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Optimal Retrofit Design of Reinforced Concrete Frame with Infill Wall Using Fiber Reinforced Plastic Materials

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Abstract : Various retrofit techniques for reinforced concrete frame with infill wall have been steadily developed. Among those techniques, strengthening methodology based on diagonal FRP strips (FRP bracings) has numerous advantages such as feasibility of implementing without interrupting the building under operation, reduction of cost and time, and easy application. Considering the safety of structure and retrofit cost, the most appropriate retrofit solution is needed. Thus, the objective of this study is to suggest pareto-optimal solution for existing building using FRP bracings. To find pareto-optimal solution analysis, NSGA-II is applied. Moreover, the seismic performance of retrofit building is evaluated. The example building is 5-storey, 3-bay RC frames with infill wall. Nonlinear static pushover analyses are performed with FEMA 356. The criterion of performance evaluation is inter-story drift ratio at the performance level IO, LS, CP. Optimal retrofit solutions is obtained for 32 individuals and 200 generations. Through the proposed optimal solutions, we confirm the improvement of seismic performance of the example building.

Keywords : retrofit, FRP bracings, reinforced concrete frame with infill wall, seismic performance evaluation, NSGA-II
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