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Seismic assessment and retrofit of fire-damaged 18-storey RC building

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During past seismic events, damages of many existing structures occurred. Retrofit of these structures before the earthquake reduces the hazard and mitigate casualties in the future. In this paper, the seismic assessment and retrofit of fire-damaged Reinforced Concrete (RC) structures not designed to withstand seismic loads based on recent seismic codes was considered. For this aim, 18-storey RC building damaged in fire for 12 hours selected to evaluate seismic performance. Since the demand of the selected RC building was increased due to fire and not be considered in usual design, the structure was modeled with finite element method in DIANA FEA 10.1 to represent this effect. To assign the behavior of structural and non-structural elements of building in the fire for heat flow analysis, some experiments were carried out to show the heat dissipation of materials. After micro modeling to assess the seismic behavior of the structure, dynamic and damage analysis were done under 7 earthquake records based on FEMA-356. Selected retrofit approach, which contains steel jacketing and adding structural element to increase to the capacity of structure by considering innovations in connections, was carried out show the reduction of vulnerability. The results illustrate that the building needs seismic retrofit because of increasing in demand and fire. Furthermore, hybrid retrofit method was designed to overcome the effects of fire and seismic loads simultaneously. Then the elements and connections between beams and columns, shear walls, shear walls and foundation illustrate an effective role in improving the seismic behavior of building under earthquake loads.

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