

## RESILIENCY COMPARISON OF R/C FRAMED STRUCTURES WITH WALL & SLAB SYSTEMS

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Today, due to natural disasters such as earthquake, flood, and storm, it is very important to pay attention to the functionality reduction happening in structures facing such events, as well as the amount of damage to structures and the time required to return to Pre-earthquake state.

Therefore, a concept called resiliency which is defined as the ability of a system to reduce the chances of a shock, absorb such a shock if it occurs and recover quickly after a shock (Amaratunga & Haigh, 2011; Cimellaro et al., 2009; 2010).

In this study, due to the importance of the proposed issue, a resiliency comparison is made between the two structural systems, Wall & Slab and Special Moment Resisting frame, facing earthquakes at the levels of DBE and MCE.

To do this, two ten-story models in each of the structural systems are fully designed and modeled. Subsequently, for nonlinear analysis, Seismostruct software was used (SeismoSoft, 2018). By using the incremental nonlinear dynamic analysis (IDA), collapse fragility curves are obtained for both models. In this research, 22 pairs of far-field records which are proposed by FEMA P695 are used for the analysis (FEMA, 2009).

Therefore, to achieve a better prediction on the seismic losses of buildings in earthquakes, all structural components of buildings should be considered. To address this issue, the next generation performance-based seismic design method (i.e., FEMA P-58 Seismic Performance Assessment of Buildings, Methodology and Implementation), referred to as “FEMA P-58 method” hereafter, was proposed by the Federal Emergency Management Agency (FEMA) of the United States (US) (FEMA 2012a,b). An associated software (i.e., Performance Assessment Calculation Tool (PACT)), was also provided to facilitate the implementation of the FEMA P-58 method (Tian et al., 2016). Based on this method, the repair cost, repair time and casualties of buildings under earthquakes can be readily obtained. In the end, considering probability curves, repair cost and repair time, it is observable that wall & slab system is better than moment resisting frame structure, considering functionality degradation and the amount of damage point of view. But by taking the volume and the amount of walls used in wall & slab structures into consideration, moment resisting frame structure acts better.

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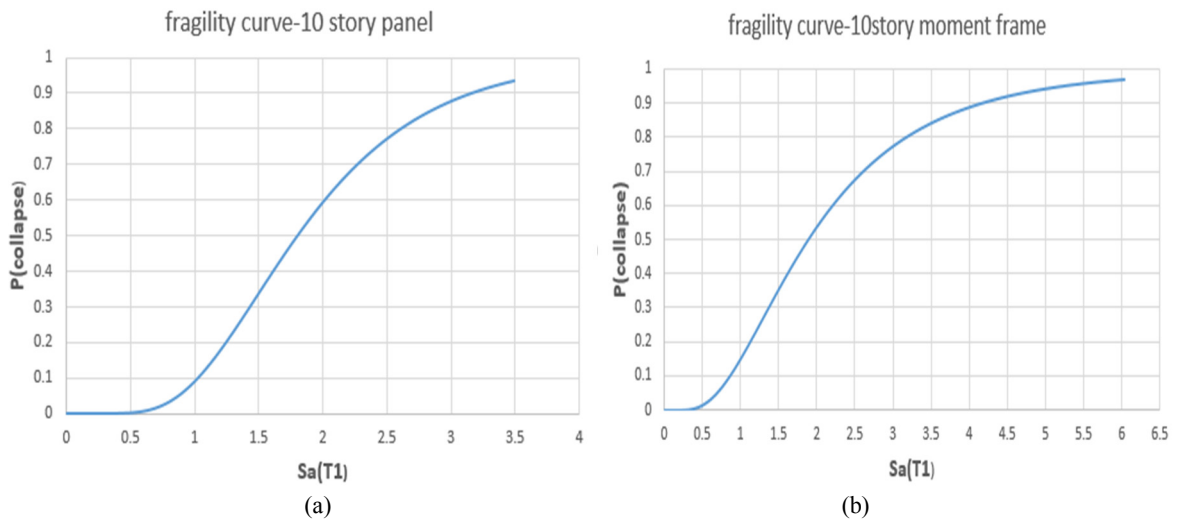


Figure 1. Collapse fragility curve for wall & slab (a), and moment resisting frame (b).

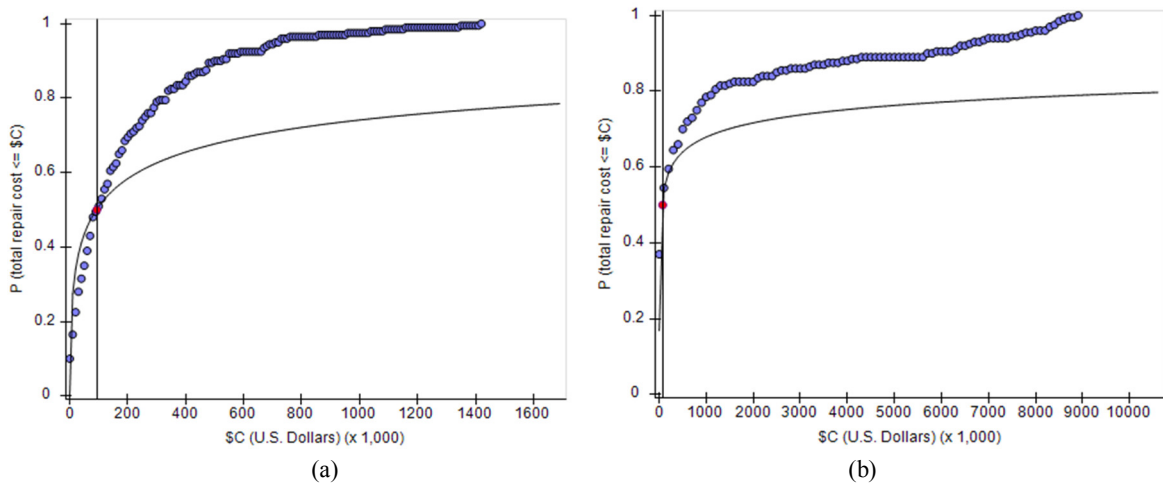


Figure 2. Repair cost for wall & slab (a), and moment resisting frame (b).