

Seismic response analysis of linked twin tall buildings with structural coupling

ABSTRACT

Effect of structural links on seismic responses for a linked building system has been investigated in this paper by using finite element modeling technique. The linked building system in this study is represented by twin 40-story reinforced concrete frame-wall structures horizontally coupled by structural links. It is assumed that the two adjacent buildings were similar in this linked building system, so the two adjacent stories could be linked at the same height by an inter-building link. The linked building system is modeled as a rigid floor diaphragm for towers and as a beam for each link fixedly linked to the perimeter structural framework of the buildings. By employing earthquake time history excitation, the seismic responses of the twin towers were computed at different locations for the link. The responses of structures were evaluated and compared. The analysis outcomes indicated that the link could effectively change the structural responses of the linked building system. The structural responses have been decreased in some cases compared to the single tower, referring to the extra link stiffness as gathering the single tower to withstand seismic excitation. While the responses have been increased in other cases, attributing to the additional mass of link. Thus, in the design of seismic-resistant linked building systems, care must be taken. Particularly regarding properties of the link, specifically mass, stiffness, and location, as well as the link resistance with respect to the strength of the link and/or the structural elements composing the link to obviate undesired structural responses.

Keyword: Structural coupling; Linked buildings; Twin buildings; Finite element; Seismic response analysis; Earthquake excitation