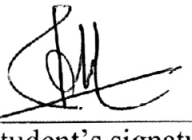
Rinchen 2008: Competitiveness of Structural Systems in Medium-Height Reinforced Concrete Buildings. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering.
Thesis Advisor: Mr. Kitjapat Phuvoravan, Ph.D. 138 pages.

Structural system is the integral part of the building in resisting the lateral loads arising from earthquake and wind. In this study, five different structural systems namely rigid frame, shearwalled-frame, framed-tube, braced-tube and outrigger are incorporated into the hypothetical 25-story reinforced concrete building in sequence to examine the response of each under the effect of earthquake and wind. Seismic analyses based on response spectrum and linear time history analysis, and the dynamic effects due to wind are considered. Structural responses in terms of natural periods, story shear, story moment, story deflection and story drift ratio, obtained from the analyses, are compared among different structural systems. Because of the symmetrical plan of the building adopted in this study, analysis of eigenproblem yielded nearly equal natural periods for two consecutive modes of vibration. The seismic story shear and story moment are marked by irregular variation while wind story shear and story moment are smooth over the height of building. However, the story displacement and story drift profile are similar, differing only in magnitude, for both earthquake and wind. Structural systems having shorter periods are governed by the seismic responses. Conversely, structural systems with longer periods are governed by the wind responses. Hence, the use of same approximate periods, stipulated in many codes, does not provide same level of safety for both wind and earthquake. Cross-wind accelerations at roof level are higher than along-wind acceleration, indicating that cross-wind has significant influence on human comfort criteria. Besides structural behaviour, cost forms another important factor in the evaluation of performance of structural systems.



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