Title Application of Linear Time History Analysis in Code-Based Design of Tall Building Instead Of Response Spectrum Analysis

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Abstract

Nowadays, it is very popular for constructing low to high rise buildings in the world due to increasing population that is required to resist the lateral dynamic loads caused by earthquake. Earthquake effects are more intense than wind effects. From past intense disaster, it can be proved that many structures are totally damaged because of earthquakes, that is natural and unpredictable, which gives intense ground shaking. Therefore, earthquake analysis and design are very important role in today world. There are many different techniques of seismic analysis of structures such as equivalent lateral force analysis (ELF), response spectrum analysis (RSM), and time history analysis (TH).

As prescribed in various seismic codes and guidelines, the individual modal responses are first determined in this procedure and then combined using a suitable modal combination rule (usually SRSS, if the natural periods are well separated) to get the overall elastic seismic demands. The inelastic force demands are then determined by directly reducing the linear elastic forces by a response modification factor (R). This study proposes and evaluates the use of LTHA procedure instead of code based RSA procedure for determining the design seismic demands of high-rise RC shear wall buildings. Using a 32-story case study building located in a seismically active region, it is shown that the standard RSA procedure results in a costly design compared to the LTHA procedure. The use of LTHA for an accurate determination of design seismic demands should be encouraged among the practicing engineers

Keywords Equivalent lateral force analysis, Response spectrum analysis, Linear time history analysis, Code based procedure, Response modification factor