

Investigating dynamic instability of RCS frames in five- and twenty- story buildings under earthquake lateral loading

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Abstract

In this research seismic behavior of RCS frames against earthquakes will be studied, and their stability will be examined. Accordingly, the primary designs will be three-dimensional (3D) frames, then they will be considered as two-dimensional, examining frames' dynamic instability. Structures will be examined in two heights (five and twenty stories) and two bays (three and five) and their heights and widths will be symmetrical. First of all modelling and design phases are discussed, then results of structures' linear analysis will be provided. Next OPENSEES and its analytic applications will be introduced briefly. After that building material, used for modeling proposed frames, their behavior and their analysis with ANSYS software will be discussed. Generals of incremental dynamic analysis and selecting earthquake records will be provided for studying structures seismically. Then summary curves of incremental dynamic analysis is developed, and fragility curves, developed for studying probability of seismic vulnerability, will be examined. Finally, various charts showing processing results will be compared according to near-fault records.

Keywords: RCS, linear analysis, near-fault earthquake, OPENSEES.

1. Introduction

A large number of people live in seismogenic regions all around the world, in which the risk of earthquake with different intensities is high. Earthquakes bring about financial damages and take many lives per year.

Using various building material in building design and construction has been focused on since long time ago. One can achieve two important objectives using optimized characteristics of building material: 1) safety and good performance of the structure, and 2) economical design. Concrete has good performance against pressure, while it has weak tensile properties. Reinforcing concrete, using longitudinal and transverse armatures, will enhance its compressive and tensile performances. On the