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EFFECTS OF GROUND MOTION MODIFICATION METHODS AND GROUND MOTION DURATION ON SEISMIC PERFORMANCE OF A 15-STORIED BUILDING

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Abstract

Present day seismic analysis of structures use non-linear time-history analysis to reproduce the actual behavior of a structure under the action of ground motions. Adequate ground motion records are important to perform time-history analysis properly and real recorded ground motions are generally modified or scaled for such analysis. The need to modify and scale the ground motion time histories to the target hazard of a site of interest calls for an assessment of available scaling and matching techniques. Moreover seismic codes and guidelines in India or other countries do not consider the effect of duration on the seismic response of structure. A fifteen storied building is considered in this study. The modeling and nonlinear time history analysis is performed using SAP2000. Four ground motion modification methods are used: Geometric mean, Sa(T1) scaling, RSPMATCH and Seismosoft matching method. Structural responses are studied both for short and long duration earthquake ground motions.

Keywords: *Ground motion scaling, Multistoried building, Nonlinear response, Response history analysis, Significant duration*

1 Introduction

The seismic evaluation of existing structures and design of new structures is usually based on nonlinear static analysis procedures; however, at present, nonlinear response history analysis (NLRHA) is increasingly being used for seismic evaluation of existing structures and for design of new structures. Prevalent codes and regulatory documents for seismic design are also increasingly prescribing such analysis. In NLRHA, the seismic demands are determined by analysis of the structures based on several ground motions. Further, the ground motions used in NLRHA can be real-recorded, artificial or synthetic earthquake time histories. In absence of real recorded earthquake time history for the particular site, the ground motions can be obtained from different sources corresponding to the similar site conditions. Nonlinear structural response from such analysis is often very