

COMPARISON OF DUAL SCALING WITH AMPLITUDE SCALING OF EARTHQUAKE RECORDS FOR TIME HISTORY ANALYSIS

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ABSTRACT

The main objective of this paper is to compare the response spectra estimated when using simple amplitude and dual scaling criteria. Three structures with $T=0.1$, 0.3 and 1.0 are considered for representing the effect of different fundamental periods. These structures are considered on soil type II, medium soil, and the selection of records is based on a region with very high seismic risk. The methodology for selecting the real time histories is applied to find seven pairs of horizontal component of real earthquake records. In case of amplitude scaling, the accelerograms are scaled by spectral acceleration and further by the correction method of Standard 2800. For dual scaling the amplitude scaling is done to match the Housner intensity of the target spectrum.

In terms of the stability of the goodness of fit observed between the mean response spectrum and the design spectrum for different periods of the structure under analysis, it is concluded that the use of dual scaling offers an attractive tool to obtain sensible estimates of dynamic time-history analysis.

INTRODUCTION

Recently, time-history analysis is becoming more common in seismic analysis and design of structures. An important issue of such analysis is the selection of acceleration time histories to satisfy design code requirements and soil type at a specific site. One popular option is to use natural accelerograms which must be selected and scaled to match as close as possible all the seismological parameters affecting the target design spectrum, including the geology of the site, distance to seismic source and even the type of faulting. Further refinements for earthquake ground motion scaling criteria account for the period of the structure under analysis or even a combination of both the period and the inelastic strength of the structure (Martinez-Rueda;1998)

The dynamic analysis of structures according to seismic code regulations requires the selection and scaling of sets of accelerograms complying with certain relevance criteria. Iranian code for seismic design of structures (2800 ver3) requires that for recorded accelerograms, selection criteria concern the adequacy to the seismologic features of the sources. Tectonically and geotechnical aspects and specially the soil conditions must be match the site. Real records must also consider the magnitude, distance and earthquake mechanism.