

Design Response Spectra for Large Dams and important structures in Iran

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1. Introduction

The present paper has been prepared in connection with “Implementation of a probabilistic approach to the assessment of risk, the role of data bases in reducing uncertainty”.

To study the dynamic behavior of a Dam during strong earthquakes and then design it safe and economical, it is necessary to consider the effects of strong ground motion characteristics at the location where the structure is to be built. The peak ground acceleration alone cannot show the extent of the effect of vibrations of a structure. Other factors such as strong motion duration, site geology, frequency content of strong ground motion of the site and the corresponding structural behavior and, in all, the amount of the released energy govern the extent of detraction or damage suffered by a structure. Should the dominant frequency of the resulting spectrum from an earthquake at a certain location be close to the range of the vibration frequency of a structure, the vibration of the structure will be amplified and will result in more damages.

Several methods can be used to generate response spectra; such as a Standard response spectrum, (SRS) Site specific response spectrum and Uniform confidence response spectrum. However, the best method is the one by which the relevant spectrum is generated on the basis of the recorded accelerograms of different earthquakes at the same location. Therefore, more suitable design spectrum can be prepared for a place if sufficient number of accelerograms be available for that place, but due to the lack of sufficient number of accelerograms, the available ones can be divided into different groups and then, design spectra are prepared. Housner [1] for the first time and later, other researchers used more data and, at each stage, prepared design spectrum for the design of structures.

The most important factors that affect the shapes of response spectra (as design spectrum) are as follows:

Seismic moment or magnitude of earthquake, physical properties and thickness of the site foundation material, distance from the site to source, the mechanisms of the earthquake and significant duration of strong ground motion.

The significant duration of earthquake is affected by the distance from the source to the recording place of acceleration, site geology and the amount of the released energy. The effect of the waves propagation route (path effect) on the spectrum in high frequencies and the effect of seismic source on the response spectrum are clearly seen. Also local geological setting may demonstrate its effect at

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