



# Effect of the Width of Dam Crest on Seismic Characteristic of Critical Slice Surface on Embankment Dams

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## Abstract

Researchers have been investigated methods to precise earthquake effect on behavior of embankment dams in 60 years ago. Researchers have been evaluated different effective parameters. Width of dam crest is main part of the embankment dam. So Evaluation of seismic behavior in different crest width of dam is important. But a few researches have been assessed affect of the crest width in response of seismic parameters. So Masjed Soleiman dam for a case study has been selected. Finite Element model of Masjed Soleiman dam has been constructed in GeoStudio-Geoslope v2007 software. Also in constructing of finite element model, has been used of Mohr-Coulomb failure criterion for body of dam. For analyses of finite element model, first a layer analysis has been carried out considering 12 layers in end of construction stage. Then, this analysis has been continued considering water table and weight of dam reservoir. The earthquake records of Northridge-1994 and Loma prieta-1989 in the far field condition have been applied horizontally to the bedrock as the input for dynamic analysis. In this study, response horizontal displacements of dam crest for different models have been investigated and compare with together. Also response maximum horizontal acceleration and displacement have been assessed.

**Keywords:** Embankment Dams, Width of Crest, Masjed Soleiman Dam, Dynamic Analyses.

## 1. Introduction

Considering complex seismic behavior of embankment dam and for suitable workability against earthquake, study of earthquake effect on behavior of embankment dams were inevitable. The behavior of embankment dams, as one of the most important structures, under earthquake loading has attracted the attention of many researchers and dam designers. In the last decade, improvements in the different numerical methods have resulted in widespread use of these methods to study dynamic behavior of earth dams;

Chopra et al. (1965) by considering dam as an assemblage of two-dimensional finite elements, and the foundation as an elastic half space, determined the dynamic properties of earth dams including foundation interaction effects. Their results indicate that foundation interaction may have significant influence on the frequencies and mode shapes of vibration of earth dams and the influence of foundation interaction depends significantly on the geometry of the earth dam cross section, being relatively more important for dams with flatter side slopes [1].

Seed et al. (1966) showed that the interaction effects cannot be uniquely related to either the ratio of the period of the dam to the period of the foundation layer, or to the material properties of the dam and foundation layer. However, for the limited number of cases investigated, the interaction effects were found to be uniquely related to the ratio of the depth of the foundation layer to the width of the dam section [2].

Wilson (1969) utilized the finite element method to study the seismic response of an earth dam on a flexible foundation. The cases he presented indicated a high degree of interaction [3].

Finn and Reimer (1970) considered the interaction problem between the dam and the underlying foundation layer. They analyzed both the coupled and the uncoupled dam-foundation systems and showed significant differences in the response depending on the period of the systems compared to the fundamental period of the base input motion [4].