



## **3D effects on the seismic performance of earthfill dams.**

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### **ABSTRACT**

Conventionally the seismic performance of earth dams is usually studied by assuming plane-strain problems. However, considerable effort is required to estimate the overall three dimensional dynamic response of dams as a result of earthquake hazard. The cumbersomeness increases when the dam is to be constructed in narrow canyon. This is so because the plane strain analysis does not take into account the arching effect of the valley which is particularly relevant for dams in narrow valleys. Researches reported in this paper represent 3D numerical study of an earthfill dam subjected to earthquake loading and 3D effects on its seismic performance. The shapes of the canyon are varied to determine the related 3D effects to the seismic performance of the assumed earthfill dam model. A finite difference numerical code, FLAC3D is used during the study. The assumed 3D model contains all details of the dam body and foundation materials of Tendaho earthfill dam. The dam is an earth fill dam located in Afar regional state of Ethiopia. The area is a seismically active area as it lies on the East African Rift valley which can generate earthquake of magnitude greater than 6. The results of the study indicated an important clue which analysis model (3D or 2D) to use for which problem. Results and discussions related with the 3D effects on the seismic performance of earthfill dams are presented and applied to the seismic performance study of Tendaho dam.

Keywords: 3D, narrow canyon, seismic performance, earthquake hazard, plane-strain, arching.