

Dynamic Stability of Large Embankment Dams and a Case Study

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Abstract - Dams constructed on the area with high seismicity have a high-risk potential for downstream life and property. It is a well-known fact that active faults, which are located close to dam sites, can induce inadmissible deformation in the embankment and may cause instability of the dam and foundation materials. Direct fault movement across the dam foundation can create displacements, which result to more serious problems for embankments and their appurtenant structures. Especially active faults on or near dam sites can cause severe deformation such as slumping, settlement, cracking and slope failures of the embankment. Turkey has so many dams, which are under the influence of near field motion. One of them is Kockopru dam, which has an earthfill embankment with 74-m height from foundation level, located at a distance of 4.5 km from significant faulting system in the region. This study outlines stability analyses of large embankment dams located on active seismic area, discusses the experience on behavior of large embankment dams located on or near active faults, based on analytical analyses and presents the results of the case study, including a large dam, which is very close to an active fault system. The results show that the embankment is safe for the loading of MDE and SEE condition. For SEE loading condition local sliding problem can occur on both slopes. The author suggests to use the specified response spectrum in modeling fault displacement for dynamic analyses performed by numerical methods.

Keywords: Dam, dynamic stability, earthquake, total risk