

Two-Dimensional Seismic Response of Concrete Gravity Dams Including Base Sliding

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Abstract : The safety evaluation of the concrete gravity dams subjected to seismic excitations is really very complex as the earthquake response of the concrete gravity dam depends upon its contraction joints with foundation soil. This paper presents the seismic response of concrete gravity dams considering friction contact and welded contact. Friction contact is provided using contact elements. Two-dimensional (2D) finite element model of Oued Fodda concrete gravity dam, located in Chlef at the west of Algeria, is used for this purpose. Linear and nonlinear analyses considering dam-foundation soil interaction are performed using ANSYS software. The reservoir water is modeled as added mass using the Westergaard approach. The Drucker-Prager model is preferred for dam and foundation rock in nonlinear analyses. The surface-to-surface contact elements based on the Coulomb's friction law are used to describe the friction. These contact elements use a target surface and a contact surface to form a contact pair. According to this study, the seismic analysis of concrete gravity dams including base sliding. When the friction contact is considered in joints, the base sliding displacement occurs along the dam-foundation soil contact interface. Besides, the base sliding may generally decrease the principal stresses in the dam.

Keywords : concrete gravity dam, dynamic soil-structure interaction, friction contact, sliding

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020