Seismic Vulnerability Assessment of Non-Overflow Concrete Gravity Dam Section

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Abstract As the economy advances, there is a growing need for energy. Harnessing hydroelectric energy has emerged as a crucial strategy for addressing the energy crisis. To promote hydropower development, numerous tall concrete dams are either under construction or in the planning stages. These dams are frequently situated in areas with elevated water levels and face the challenge of being located in regions with high seismic intensity. An accident resulting from the failure of concrete dams can pose significant threats to both economic development and public safety. Therefore, it is of crucial importance to investigate the stability of such dams, particularly under conditions of high water levels and seismic activity. The finite element program Geostudio is being undertaken to evaluate a complete numerical analysis of the dam. In this paper, Longtan Dam has been selected as the case study for the research. This study is applied in two cases: seismic and static conditions. A two-dimensional seismic numerical analysis was carried out using the Koyna earthquake acceleration time records in 1976. The results of the FEM model concluded that the dam is unsafe under sesmic conditions. The concrete-rock interface, particularly susceptible to sliding, was identified as the most critical part of the dam, presenting the most likely failure mode. The study highlights the significance of its methodology in investigating earthquake effects on dams, prioritizing it over the achieved results. The aim is for the conclusions and recommendations to provide valuable guidance for future studies and initiatives focused on enhancing safety at hydropower dams.

Keywords: reservoir, geostudio, dam, seismic, Foundation

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