Mitigation Measures Evaluation for Concrete Faced Rockfill Dams

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Abstract

One of the most common types of dams is Concrete Faced Rockfill Dams (CFRD's). With higher CFRD's, some dams have experienced considerable fractures at the concrete faces, where in some instances these cracks have led to dewatering of the reservoir to allow for the concrete slabs repairs. The development of these fractures may be attributed to the highly deformable rockfill body. In general, the state-of-the-art design of CFRD's is mostly based on common practice rather than rigorous analysis procedures. And as such, cracking problems because of deformability of the rockfill may not be properly predicted unless a detailed analysis is performed.

In this paper, a new approach for analysis of CFRD's is presented. A comprehensive non-linear finite element analysis (FEA) scheme is developed to model the construction sequence, the contact interaction between the concrete facing and the rockfill body, and the impounding of the reservoir. A case study using the developed framework is analyzed, the results are validated by the field measurements, and mitigation measures suggestions are provided. This methodology, based on the results of the investigation, provides guidelines and establishes a framework for analysis of CFRD's that can be used for design purposes and prevent any cracking of the concrete faces.