Comparison Analysis of Seepage Through Homogenous Embankment Dams Using Physical, Mathematical and Numerical Models

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Abstract

Embankment dams have many advantages; however, they frequently develop seepage problems which may cause dams' failure. In this study, comparison analysis of seepage through embankment dams was conducted using three different methods, namely experimental tests, mathematical calculations and numerical modeling. Three homogeneous embankment dam models with different downstream drainage filters were considered. Results revealed that SEEP/W model is inappropriate to compute the water flow volume if there is an intersection between the seepage flow line and the downstream slope of the embankment dam due to the appearance of pipes. Numerical modeling based on SEEP/W software was found to be compatible to the rest physical models. The findings also demonstrated that for all scenarios, both the Casagrande equations and the SEEP/W model produced seepage lines that closely matched the observed seepage lines. These results highlight the significance of managing the seepage line's location to ensure the stability of embankment dams through the implementation of horizontal drains.