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Analyzing Internal Erosion Associated with Conduits in Embankment Dam

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ABSTRACT

Conduits are installed beneath embankment dams to convey water for various purposes. Internal erosion associated with conduits can lead to the failure of embankment dams through various mechanisms (FEMA, 2005; USACE, 2020). The objective of this study is to investigate the displacement distribution of small-scale earthfill models induced by internal erosion associated with conduits. Three different small-scale embankment dam models, each equipped with a conduit, are prepared in a laboratory container, and model tests are conducted under three different erosion conditions. The horizontal and vertical displacements of downstream side slope of the dam models are monitored using a dual camera system. The failure patterns of the dam models are evaluated based on the displacements obtained by the digital image correlation method. Experimental results show that internal erosion induced around the conduit in the dam models leads to differential settlement, which is a primary contributor to conditions favorable for hydraulic fracturing. Additionally, both the horizontal and vertical displacements in the dam models are highly dependent on the failure modes. Thus, analyzing the displacement distribution and behavior of embankment dams around a conduit can significantly assist in identifying the causes of embankment dam failure.

REFERENCES

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