Internal Erosion in Dams. Studies and Rehabilitation

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Abstract

In embankment dams, filters/drain systems constitute a first line of defense against the phase of continuation of erosion. It is generally assumed by several authors that the continuation of internal erosion can be prevented by using adequate granular filters in areas where important hydraulic gradients may develop. This paper addresses the most important purpose and functions of filters. Once the internal erosion process initiates, for a given load condition, and there are no effective filters stopping eroded particles along the erosion path, the occurrence of progression of internal erosion should be assessed. In zoned dams, upstream zones may assist in controlling the phase of progression of erosion, before flows became excessively large for the downstream zone to discharge safely. The limitation of the progression of internal erosion in zoned dams, potentially caused by an upstream zone can be assessed using a new test cell. This device and correspondent test results are presented and analyzed. Two case studies of dams with internal erosion problems are described. The first is an embankment dam, Lapão dam, where due to design and construction problems an internal erosion process was developed. The other is Crestuma dam, a gated structure type. Since the dam started operating, the river bed in the vicinity of the dam has been subject to frequent monitoring that evidenced progressive erosion of the protective layer. This paper presents the results of the studies undertaken in relation to the hydraulic stability of the alluvial foundation of the dam's stilling basins and of the downstream rockfill, and the main features of the implemented solutions.

Keywords: Internal erosion, Filters, Laboratory tests, Case studies, Rehabilitation.