

Experimental investigation and numerical modelling of embankment failure

Summary

Inundation by dam and levee breaches results in loss of lives and severe property and environmental damage. To reduce such impacts, reliable simulation tools are needed for land-use management and for civil protection safety plans.

Breach formation mechanisms are not completely described. Understanding these mechanisms improves engineering capacity for breach analysis (formation and temporal evolution) and for prediction of the discharge hydrograph in real complex situations. The general objective of this PhD is to assemble and validate a suite of mathematical simulation tools for embankment erosion and failure by overtopping, built upon the existing shallow-water and morphological solver STAV 2D, in development at IST.

A conceptual model to describe the flow in the enlarging breach (the discharge hydrograph) and the geotechnical failure of the embankment body will be developed. Laboratory tests will be conducted to understand the mechanics of breach evolution and to validate the numerical simulation tools. The latter will result from the improvement of existing Computational Fluid Dynamics tools applicable to geomorphic flows.

Keywords

Earth dams and levees, failure by overtopping, breaching process, experimental characterization, mathematical modelling.



Dam breach by overtopping. Experimental test.



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