

6th Workshop on River and Sedimentation Hydrodynamics and Morphodynamics

An online event

2021

Organized by

The team of Project Dam&DikeCare

Dam breach flow benchmark

Call for numerical modellers

1. Introduction

The most important source of uncertainty in the simulation of floods caused by embankment overtopping concerns the breach discharge hydrograph. It is crucial to reduce this uncertainty by developing breaching models with a good compromise between phenomenological complexity and computational cost.

Addressing this issue, Project Dam&DikeCare is aimed at building an integrated conceptual framework for embankment breaching, comprising hydraulics and soil mechanics, and a new generation of numerical simulation tools for fluid-sediment mixtures. To pursue these objectives, the work-program articulates theoretical, laboratorial and computational tasks.

Within project Dam&DikeCare, datasets have been generated to validate numerical simulation tools. Pursuing the objectives of the project, these datasets are now made available to the community of scientists interested in modelling breaching processes.

The results of this benchmarking exercise will be discussed during the 6th Workshop on River and Sedimentation Hydrodynamics and Morphodynamics. It is envisaged that a journal paper, summarizing the key findings, will be submitted to JHR.

2. The benchmark

The benchmark is divided in two steps: i) a **blind step**, whereby modellers are given the input data and provide raw numerical results ii) a **tuning step**, whereby modellers are given the measured data, are allowed to tune parameters, and provide revised numerical results.

Three test conditions are proposed:

- A - Fixed breach with falling block (steady flow)
- B - Evolving breach, homogeneous dam (unsteady flow)
- C - Evolving breach, zoned dam (unsteady flow)

For all test conditions, the following data will be given to registered modellers:

- Initial dam geometry (including initial notch) and detailed channel geometry, including inlet and outlet (see example on Figure 1);
- All data concerning geotechnical characterization of the embankments (for tests B and C);
- Monitoring variables, including, water levels in the upstream reservoir, inlet flow discharge and outlet flow discharge.



Figure 1. Left: example of physical model: 0.45 m tall embankment); right: erosion of an overtopped non-homogeneous embankment.

A complete portfolio with all information relevant for modellers will be made available for registered modellers on the 17th May.

Validation consists in quantifying the differences between measured and computed:

- breach hydrograph (tests B and C);
- breach width (tests B and C, see example in Figure 2);
- velocity time series at specific locations (all tests)

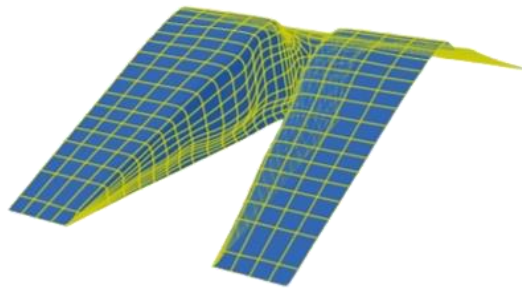


Figure 2. Example of dam morphology during the breaching process.

3. Key dates and Applications

Modellers **manifest their interest in participating and register (no fees) until the 7th May 2021.**

Interested modellers should register via email to Eng. Solange Mendes (svmendes@lnec.pt) or to Prof. Rui Ferreira (ruimferreira@tecnico.ulisboa.pt).

The registered modellers will receive the details of experimental conditions until the 17th May 2021.

The raw results of the numerical simulation should be submitted by the 12th July 2021.

The discussion of the raw results will take place, online, between the 22nd and the 23rd July 2021.

The final discussion of the tuned results will take place between the 13th and 14th September 2021.

Lisboa 19th April 2021

The Local Organizing Committee

Solange Mendes
Sílvia Amaral
Carlos Fraga Filho
Teresa Alvarez
Rui Aleixo
Teresa Viseu,
Rui M.L. Ferreira