1 INTRODUCTION

This test case aims to investigate the geomorphic evolution of an idealised prismatic valley due to a dam-break flow and particularly to investigate the lateral erosion of the banks. Small-scale laboratory experiments proved to be able to reproduce quite well the behaviour of observed in real test-cases. Experimental data is obtained using a non-intrusive laser-sheet technique, i.e. without perturbing the flow. This technique allows to measure the evolution of the shape of a given cross-section, due to the movement of sediments on the bed and the banks.

This work is part of work package 4.2 of the IMPACT project. The benchmark based on this experiment is presented in this paper. It will allow to validate numerical models taking into account rapid sediment movement processes.

2 TEST CASE DESCRIPTION

2.1. Initial configuration

Dam-break wave experiments in an erodible channel were carried out at the Civil Engineering Laboratory of the Université catholique de Louvain. Figure 1 shows the configuration of the set-up. It consists of a half-width channel with a single erodible bank. The other side is limited by a glass wall. The total length is 2.92 m. The initial shape of the cross-section is prepared by profiling compacted sand as defined in Figure 2. In the longitudinal direction, the bed (8 cm above the rigid bed) and the crest of the bank are initially horizontal.

The erodible bed is initially saturated and the bank crest only partially saturated. The reservoir upstream of the sluice gate is filled with water at rest up to a level of 15 cm above the...
downstream erodible bed. Experiments are launched by suddenly raising the gate. This releases a dam-break wave which rapidly propagates down the channel and triggers a series of bank failures. The experiments were found to be reproducible. More details about the experimental campaign can be found in le Grelle et al. (2004).

2.2. Sediments characteristics

The sand used is an uniform coarse sand with the following characteristics:
- median diameter = 1.8 mm
- specific gravity = 2.615 t/m³
- loose bed porosity = 40.5%
- permeability = 1.5 cm/s

2.3. Measurement technique

The channel is lightened laterally with a laser-sheet (Figure 3). The enlightened cross-section is then filmed using digital cameras. A sample result can be seen in Figure 4, where the trace of the laser can be clearly identified, both under and above the water. On each image, the pixel coordinates corresponding to the trace of the laser are identified using an automated algorithm. Those pixel coordinates are then projected in 3D space using separate geometrical transformations for the above-water and under-water profiles.
2.4 Boundary conditions

The reservoir is filled up with water at rest up to a level of 15 cm above the downstream erodible bed (thus 23 cm from the origin). The dimensions of the reservoir are sketched on Figure 5.

Upstream of the gate, a rigid bank (1.2 m length) is set to avoid bidimensional effects in the stream (Figure 1).

3 EXPECTED RESULTS

Experiments were carried out at following longitudinal coordinates (distance from the gate, expressed in meters): 0.25, 0.5, 0.75, 0.95, 1.25, 1.5, 1.75 and 2.25.

Expected results are:
- The numerical method used, or a reference where a description of the method can be found;
- Comments regarding the results and the simulation, if any.
- The evolution of the shape of the sections at 0.25, 0.5, 0.95, 1.5 and 2.25 m during the simulation at specific time t=1 s, 3 s, 5 s, 10 s and 15 s. Results will be presented in a file for each section at each time as following (thus 25 files):
The name of the files will be build like this: *Name of the institution (3 characters)_x-coordinate_time*. For example, for UCL, the file corresponding to the shape of the cross-section located at \(x=0.25\) m, at time \(t=1\) s will be: *UCL_025_1s*. The origin and the direction of the axis is sketched at Figure 6. The origin of the X-axis is located at the gate.

Results and questions can be addressed to Nicolas le Grelle: legrelle@gce.ucl.ac.be

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**REFERENCE**