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Numerical simulation
of sediment flushing in
reservoirs

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Background

In my master thesis at NTNU, my work is on a numerical model of a sediment flushing scenario of a reservoir. The flushing has been carried out in a physical model in the Department's laboratory. The goal was to build up this physical model numerically, and check if the numerical tool Telemac can be used to simulate the sediment flushing scenario or not. At the same time, in case of Telemac's applicability, to compare the forming flushing cone of the numerical and physical model.

The test flume was straight and without any bed slopes. It was separated by a sluice gate into an upstream (reservoir) and downstream part. In the upstream part, an initial light weighted, noncohesive sediment layer was placed on the bottom, up to the closed sluice gate. The test started when the sluice gate was suddenly opened to a certain height, letting through the water and the sediment towards the dry downstream. After the decrease of water level reached a certain point, the gate was closed and the final flushing cone was scanned. The size and shape of the cone, the speed of the formation was compared to the results of Telemac (Telemac-3D and Sisyph  modules). The challenge was to find out how to use the free surface flow model Telemac for this

pressurized flushing scenario and model the sudden opening of the sluice gate. To solve this problem, the culvert function of Telemac was used, which was introduced quite recently. After the comparisons, the results were found to be satisfactory.

