

README

- INFO

The datasets are part of the master thesis of Martijn Helsdingen. Relevant information of the report:

Name: *Experimental modal validation of a semi-analytical method for assessing dynamic behaviour of flood gates*

Link: <http://resolver.tudelft.nl/uuid:a9a2f6d9-9384-40b3-b614-afa28510911f>

Master thesis is executed in order to finalize the master of Hydraulic Engineering at the Delft University of Technology.

The dataset that is accompanied only contains data from the experiments that are used for the analyses of this master thesis. Datasets contain **raw data** only and still need to be processed.

IMPORTANT NOTE the following datasets are already processed with UNKNOWN calibration factors for the accelerometers:

- Reinforced Plate: 3_Dry_Modal_Analysis_033
- Reinforced Plate: 3_Dry_Modal_Analysis_034
- Reinforced Plate: 3_Dry_Modal_Analysis_035

The corrupted data did not affect the research, mentioned above, in which the data was applied. In case of analyses involving time series one has to take care when using this data.

Datasets for different plates are located in the different subfolders with the plate's name as its title.

- EXPERIMENTS

Experiments are executed in the wave flume at the faculty of Civil Engineering at the Delft University of Technology. Experiment consists of three different types:

- Dry hammer on the plates
- Wet hammering on the plates in submerged condition for different water levels
- Regular wave experiments for the reinforced plate for different water levels

For a detailed overview the reader is referred to the excel file 'Details_Experiments' tab 'Experiments' located in this folder. 'Details_Experiments' tab 'Regular Wave Impact – details' gives details about the water level, wave height, wave length, wave period and wave skewness for the different experiments.

The measurement frequency of all datasets is set on 5000 Hz.

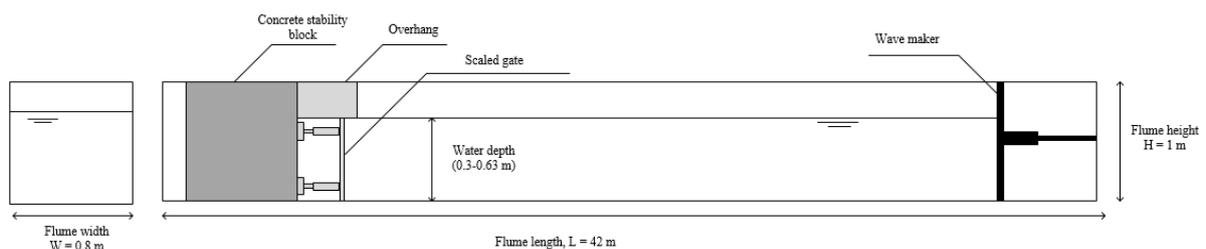


Figure 1 Test set up flume

- GATES AND GRID

The axis of the plates are such that the origin is located at the lower left corner, when looking at the plate from the water side. An overview of the measurement plan for the accelerometers and strain gauges is given in the figure below.

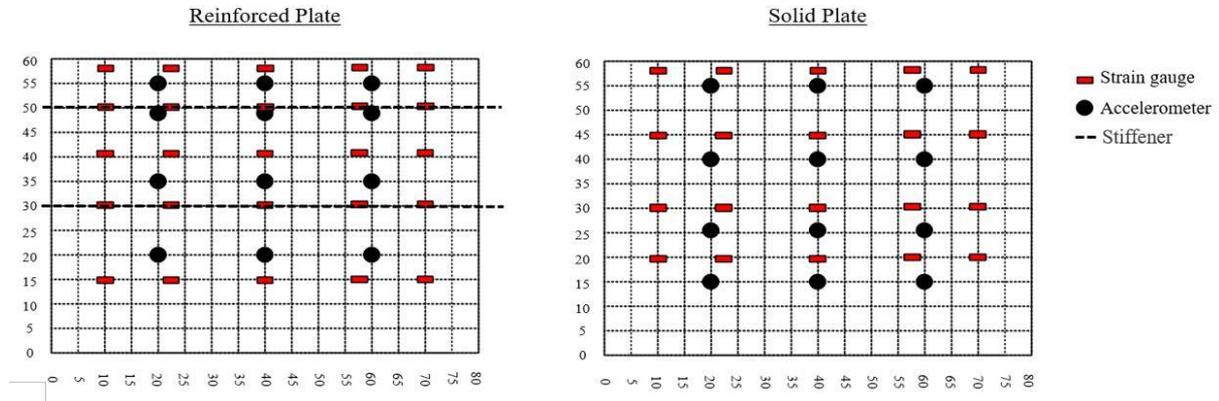


Figure 2 Sensor locations on the gate when looking from the water side. The second and fourth column of sensors are not plotted correctly. These should be 0.25 m and 0.55 m respectively.

- DETAILS ACCELEROMETERS

For details regarding the calibration factors and inclination angles, the reader is referred to the excel file 'Details_Experiments' tab 'Accelerometers - details'. The Voltage/Degree is used for calculating the inclination angle of the accelerometers according to:

$$\alpha_{inclination} = \frac{\Delta\alpha}{\Delta V} * (V_{0g} - V_{t=0}) ; \frac{\Delta\alpha}{\Delta V} = \frac{\alpha_{+1g} - \alpha_{-1g}}{V_{+1g} - V_{-1g}}$$

In which $\Delta\alpha/\Delta V$ is the reciprocal of Voltage/Degree. V_{0g} is found in the column '0g voltage'.

Calculations can be executed in the accompanied Matlab files. $V_{t=0}$ depicts the voltage at $t = 0$ s.

- DETAILS STRAIN GAUGES

A detailed location of the different strain gauges is given in the excel file 'Details_Experiments' tab 'Strain Gauges - details'. Data regarding the strain gauges is already calibrated using the prescribed calibration factors of the manufacturer.

- DATA PROCESSING

For data processing two Matlab files are given in the folder:

- Solid Plate : *Data_Processing_SP.m*
- Reinforced Plate : *Data_Processing_RP.m*

These files automatically process the data according to the methods described in the corresponding master thesis of Martijn Helsdingen.