Title: Coastalock™ Performance on a Permeable Breakwater Slope: Model Tests on the Influence of a Permeable Core, Unit Modifications, and Toe Support on the Hydraulic Performance of an Ecological Armour Unit

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Description:

This dataset contains the underlying data utilized in completing the MSc thesis titled 'Coastalock™ Performance on a Permeable Breakwater Slope: Model Tests on the Influence of a Permeable Core, Unit Modifications, and Toe Support on the Hydraulic Performance of an Ecological Armour Unit'. The research was a collaborative effort between the TU Delft Faculty of Civil Engineering and Geosciences and ECOncrete LTD. This dataset provides comprehensive results related to video-based stability, overtopping, and reflection, along with other pertinent aspects.

Included in the dataset is:

- Information on materials used for constructing the physical scale model and their respective characteristics.
- Raw outputs from wave gauges, including voltage factors for measuring wave characteristics and water level increase in the overtopping basin.
- 3D models generated using Agisoft Metashape, CloudCompare, and Open3D through a Structure From Motion (SfM) methodology to monitor armour layer movement.

For effective data interpretation and usage, it is recommended to review the MSc thesis and the instructions provided with the dataset.

Notes on Naming Conventions

1) **Renaming of Test Series ID:** As the thesis progressed, the naming system was altered. Below is the explanation of the old and new systems:

Old - Thesis - Explanation:
1st part:
- DW → DW: Deep Water
- TF → TR: 'Toe on Rough' (filter)
- TS → TS: ‘Toe on Smooth' (glued bird sand)

2nd part:
- S00 → S00: Simple spacing 0%
- S10 → S10: Simple spacing 10%
- S20 → S20: Simple spacing 20%
- P1 → P22.5: Long protrusions with 22.5% spacing
- P2 → P10: Short protrusions with 10% spacing

Optional part:
- a: PO-Midpoint configuration
- u: Upwards configuration (side chain error)
- u2: Upwards configuration re-run

3rd part:
- s2: s0p=0.02
- s4: s0p=0.04

4th part:
- H…: Hs setting wave maker

2) **Notes on 'Reanalysis dataset Molenkamp' (Molenkamp, A. (2022). Hydraulic performance of Coastalock armour units. [Master's thesis, Delft University of Technology]):** The naming of the test series for the wave gauge set 2 (near-structure) has been altered for the folders. For a detailed description of the naming process, please refer to the work of Molenkamp.

- Lawniczak – Molenkamp:
  - S00s2 – series 09
  - S00s3 - series 22
  - S00s4a - series 50
  - S00s4b - series 60
  - S00s4c - series 60
  - S00s5 - series 24
  - S00s6b - series 07
  - S00s6a - series 08
  - S05s4 - series 10
  - S07.5s4 - series 19
  - S10s2 - series 23
  - S10s4 - series 11/12
  - S10s4u - series 21
  - S15s4 - series 13
  - S20s4 - series 14
  - S25s4 - series 15

Content

1) Material

Contains the specification of the WHM used in the study, the PLA material for printing protrusions, along with an .xlsx of characteristics such as weight, volume, density, and nominal diameter of the altered model units. Grading for the filter layer, core, and toe/crest rocks is also included. Scripts are available in .ipynb format.

2) Overtopping

The folder contains raw .ASC data measurements from the WHM in the overtopping basin. Files ending with OT represent additional measurements taken after the test series due to water exceeding the basin or time needed for the water level to settle. The output is converted and summarized in the .xlsx file. .py files used for overtopping analysis are also provided.

3) Pressure Data

Raw pressure data is provided in .ASC format along with a schematic drawing of the sensor placement (Honeywell Miniature Low Pressure Sensors - 26pcafa6d) in the structure. This data has not been used in the thesis.

4) Reflection

This folder contains .py files used for reflection analysis. Reflection coefficients are present in the Results.xlsx file.

5) Results

The Results.xlsx file includes all relevant information regarding test runs of each test series:

- Intended significant wave height, peak period, and wave steepness
- Measured significant wave height, peak period, wave steepness, and reflection coefficient at the first and second set of wave gauges
- Stability number reached and indications of visual observation of 'breathing' or extraction

6) Stability – Elevation

- CloudCompare: Contains .pcd files of the filtered, cut, reoriented, and translated armour layer, ready for analysis.
- Open3D: .py files for calculating elevation of grid cells, along with a .txt file containing input parameters for gridding and boundary determination. Code in .py format results in outputs that include .txt files with elevation data of grid cells for each depth map and differences between subsequent depth maps. .py files for further analysis of the differences and plotting of four main output formats: depth map, maximum elevation, movement above threshold, and width-averaged slope.

7) Stability - Settlements

Contains .bin files with the location of shapes drawn using the poly-line function in CloudCompare on the accompanying .pcd slope files found in the Elevation folder. The centroid of the triangles is compiled in the .xlsx files, and differences are calculated.

8) Wave Characteristics

This folder includes the wave decomposition program decomp_lib for single file and batch processing, along with input wave files for both WHM groups and the calibration file of the WHM in .ipynb format. Missing wave data prediction methods are also provided: due to lack of measurement and clipping.