

## MSc Thesis Proposal

### Detection of impacting waves on coastal structures in high-speed video stream

#### Introduction

Safety assessment of coastal structures (e.g. breakwaters, harbour moles, dikes and revetments) is almost exclusively based on laboratory tests. Coastal structures are (re)built in a wave flume (2D) and/or basin (3D) and exposed to a series of normative water level and wave conditions, generated by a wave board. The laboratories at Deltares are amongst the largest and most advanced testing facilities in the world.

Water levels, wave heights and speed and flow velocities are key parameters used for the safety assessment of coastal structures. These indicators are traditionally measured using devices placed in the flume or basin. Recently, Deltares successfully experimented with using deep learning to extract waves from a high-speed video stream. The detected waves are subsequently used to extract parameters of interest, like local water depth, wave height and speed. Preliminary results indicate that video-based measurements are more complete, more accurate and cheaper than traditional measurements.

#### Proposal

This MSc thesis proposal aims to improve, expand and validate the use of high-speed video in combination with deep learning in the test facilities at Deltares. The MSc candidate focusses on the development of algorithms for wave runup measurement over complex, irregular coastal structures. Challenges are found in the required robustness of the algorithm to collapsing, turbulent waves in various appearances and the practical limitations of a hydraulic laboratory.

We look for a MSc candidate that:

- is skilled with Deep Learning
- is skilled with Python
- is an independent worker and takes initiative
- is enthusiastic to bring AI theory into engineering practice

We offer a MSc candidate:

- an informal, but challenging research environment
- responsibility and excellent supervision
- a large student base

#### More information

Contact Bas Hoonhout ([bas.hoonhout@deltares.nl](mailto:bas.hoonhout@deltares.nl)) for more information.