WATER INFORMATICS SCIENCE & ENGINEERING
EPSRC CENTRE FOR DOCTORAL TRAINING

Engineering and Physical Sciences Research Council

Composite Beaches and Dynamic Revetments – Coastal Protection Inspired by Nature

Oliver Foss, University of Bath

Supervisors: Dr Chris Blenkinsopp, Dr Jun Zang

Coastal regions face significant risks due to climate change, rising sea levels combined with an increase in both duration and severity of storms will lead to increased erosion of the coastline. Presently 24% of sandy coastlines around the world are losing more than half a metre a year (Luijendijk, et al., 2018), highlighting the severity of the issue. It is proposed that dynamic revetments will be an important asset for future coastal protection schemes and aid in addressing the issues climate change poses for coastal regions. This project uses a combined experimental and modelling approach, this will result in a deeper understanding of dynamic revetments and is expected to result in the creation of a new modelling tool.

Dynamic Revetments

Dynamic Revetment at North Cove Washington

Dynamic revetments offer an alternative form coastal protection, possessing cost advantages over more traditional methods such as sea walls. There have been relatively few constructed so far such as the one in North Cove pictured above.

Mimicking the naturally occurring formations of composite beaches, dynamic revetments are a ridge of cobbles or gravel placed at the backshore of a sand beach. This backshore ridge is continuously reshaped by forces including wave attack, however, the overall structure remains stable throughout these processes. It is expected to result in erosion control for both the upper beach and hinterland as well as effective overtopping protection.

Laboratory Experiments of Dynamic Revetments

There have been two large scale experiments exploring the behaviour of constructed dynamic revetments, called DynaRev and DynaRev2 respectively. Both experiments were carried out in the Großer Wellenkanal (GWK) flume based in Hannover by a multinational team of scientists from various institutions.

The DynaRev experiment was carried out using high quality material with a low degree of cobble variation. In contrast, the DynaRev2 experiment uses poorly sorted cobbles with a high degree of variability. The idea being that such material is both cheaper and easier to attain for construction purposes

DynaRev2 Research Aims

1. Determine the performance of a dynamic revetment using varied cobbles under a both energetic wave conditions and incremental sea level rise.
2. Test the recovery process of the dynamic revetment by testing its ability to reform after energetic wave conditions. Test maintenance of the structure by cobble ‘re-nourishment’.
3. Using both experiments to improve theoretical understanding of the physical processes in dynamic revetments and improve the current modelling ability for such structures.

DynaRev 2 Experiment Day 10.

Future Work

The proposed work of the project going forward is as follows;

1. A detailed comparison between the two revetment designs, looking at performance and behaviour.
2. Creation of a design tool/model which can be applied to both dynamic revetments and composite beeches.

The work presented above was supported by the EPSRC Centre for Doctoral Training in Water Informatics Science and Engineering (WISE CDT; EP/L016214/1).

UNIVERSITY OF EXETER · UNIVERSITY OF BATH · University of BRISTOL · CARDIFF UNIVERSITY · PRIFYSGOL CAERDYDD

www.wisecdt.org.uk