

## Application of scanning techniques for damage analysis in rubble mound breakwaters

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Damage evolution in rubble mound breakwaters is one of the key issues in coastal engineering, in particular their design, linked to maintenance and preventive strategies. One of the major challenges is to determine how the lower parts of the breakwaters evolve under sea states. The settlements and movements in this area are responsible of the evolution in the medium and upper parts, in particular the active zone, that are finally the areas where the initial damage and destruction are produced. To analyze these zones, scanning methodologies are increasing their application, specially to determine more precisely the initial movements of the pieces, porosity evolution and damage. This paper presents the application of a scanning device, a Kinect® system, both to analyze a rock armour and Antifer protection in 2D tests conducted in two facilities: LNEC (Portugal) and CITEEC (University of A Coruña, Spain). The analysis presents the initial approach to the validation process and calibration errors, and comparison with existing formulae. The comparison was done only in the initial and final steps, so no water was present in the flume when scanning. Further work is actually developed with intermediate steps (and water), and 3D tests including a roundhead (RODBreak project, Hydralab+, H2020-INFRAIA-2014-2015. Project ID: 654110).