Concrete Block Tracking in Breakwater Models

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SUMMARY

The protection of harbours in coastal areas, that are exposed to the action of the sea waves, is made by breakwaters. During the phase of design of new breakwaters or the rehabilitation of existing ones, the evaluation of effectiveness of the shape and of the protective elements to save the harbour, 3D scale models are built inside wave basins or wave flumes. In the testing phase, water waves are generated, and the resulting impact on the breakwater model is periodically evaluated to study the hydraulic and structural behaviour under predefined sea-wave conditions. This study proposes a methodology to estimate displacements of concrete blocks of the outer layer, also called protection layer, of rouble-mound breakwater model. These blocks are placed in the areas where it is expected that action of the waves is stronger. The combination between the 3D information of a point cloud survey and the visual information of a digital image is a key factor for estimate the spatial location of some notable points of the blocks, in particular, the geometric centre. The location of a block centre point, at different instants, give its spatial displacement. The equipment used in data acquisition tests was the Kinect V2 sensor and a digital camera. The data collected by these allowed the generation of point clouds (X, Y and Z) and orthomosaics, both fundamental for the determination of displacements.