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Experimental Study of Irregular Waves on a Gravel Beach

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In the east coast of Taiwan, the sort grain size more belongs to cobble or gravel, which is physically distinct compared to the sandy beach in the west coast of Taiwan. Although gravel beaches can dissipate more of wave energy, gravel beaches were eroded and coastal road were damaged especially during typhoons. The purpose of this study is to investigate the geomorphological response of gravel beach due to irregular waves.

This experiment was carry out in a 21m long, 50 cm wide, 70 cm high wave tank at Tainan Hydraulics Laboratory, National Cheng-Kung University, Taiwan. To simulate of the geometry in the east coast of Taiwan, a physical model with 1/36 scale-down was used, in which the seawall was 10cm built upon a 1:10 slope and gravel grains with D50 being 3.87 mm was nourished in front of the seawall. In terms of typhoon-scale wave condition, irregular waves with scale-down conditions were generated for 600 s for each scenarios and, three different water levels with respect to the gravel beach are designed. Application of laser combined with image processing to produce 3D topographic map, the erosion zone and accretion zone would be found. The resulting morphological change of gravel beach will be measured using an integrated laser and image processing tool to have 3D topographic maps.

It is expected to have more understanding about under what conditions the gravel coasts suffer the least damage. In particular, the relation between erosion rates of gravel beach, the angle of gravel slope and the length of the plane on the gravel slope will be achieved