CHANGE OF HORIZONTAL WAVE PRESSURES ON A CAISSON DEPENDING ON THE CREST LEVEL OF ARMOR LAYERS ON THE RUBBLE MOUNTED CORE

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INTRODUCTION

This study reports physical experiment campaign to measure horizontal wave pressure acting on a solid caisson that is protected with double-layer Tetrapods and core-layer of rubble stones. The main focus of this study was to evaluate the effects of crest level of the armor layers on the measured wave pressures. As illustrated in Figure 1, the measurement was conducted with four different models in terms of the coverage of the front face of the caisson: no coverage, full coverage up to the crest of the caisson, and two different partial coverages where the crest level of the armor layers were lower than the crest of the caisson.

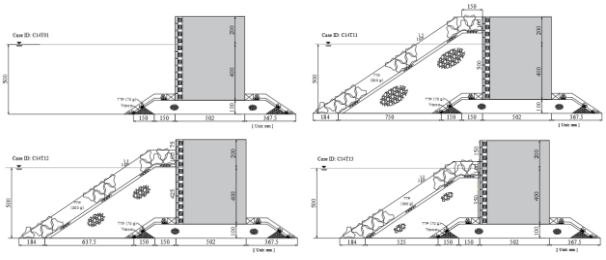

Figure 1 – Side views of the four different models

PHYSICAL EXPERIMENTS

The experiment was carried out in a two-dimensional wave flume. The dimension of the caisson model is 0.45 m long, 0.4 m wide, and either 0.5 or 0.6 m high. Figure 2 shows diagrams of the model of 0.6 m high. Wave pressures were measured by miniscule disk-type pressure transducers with a diameter of 10 mm, which has been used in Oh and Ji (2019). The front face of the model consists of multiple acrylic plates. Each of the plates consisting of the model front wall is 5 cm high and 40 cm wide. As shown in the right panel of Figure 2, a single pressure transducer was buried into the center of the each plate. 20 different regular waves were generated for the measurement as shown in Table 1. The wave generation time was 60 seconds for all the test wave conditions.

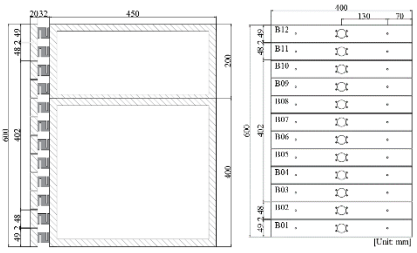

Figure 2 – Diagrams of the caisson model showing the setup of pressure transducers

Table 1 Summary of the test wave conditions

h [m]	T [s]	H [m]	s
0.5	1.5 - 2.5	0.16 - 0.33	0.03 - 0.10

EXPERIMENTAL RESULTS

Figure 3 shows the distribution of the maximum wave pressures along the front wall of the caisson. In addition, the magnitude of the maximum force was estimated by taking an average of the maximum values of the each separated segments, within the effective time duration that is free from re-reflection of the waves from the wave paddle. The wave pressures above the still water level showed significant discrepancy depending on different armor coverages, especially for the caisson that are partially protected by armor blocks. It seemed that impulsive loadings acted at times on the top exposed part of the caisson if the caisson is imperfectly protected by armor blocks. Such impulsive loadings have occurred because waves broke over the fore slope of the armor layers and directly hit the caisson unless it was fully protected by armor blocks. More detailed analysis results are presented in Oh and Lee (2020), and scheduled to be presented at the conference.

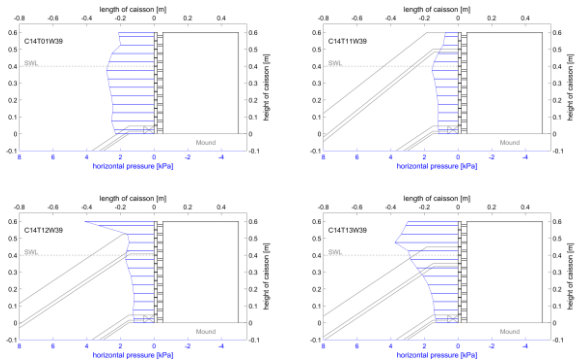

Figure 3 – Examples of the maximum horizontal pressures on the four different models

REFERENCES

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