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## **Hydraulic Response of Rubble Mound Breakwaters**

*scale effects - berm breakwaters*

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## APPENDIX E

# Conventional Breakwater, Large Scale Test Results

In the following tables the main results from the present large scale physical model tests are given.

Description of parameters in table:

1. Test number.
2. Type of cross-section as defined in Fig. 10.3 (1 - low wall; 2 - normal wall; 3 - high wall; 4 - high recurved wall).
3. Water depth at toe of structure.
4. Armour crest freeboard.
5. Crest freeboard.
6. Amplitude reflection coefficient at toe of structure calculated as given in Eq. 1.20 from the Mansard and Funke, 1980 reflection analysis method.
7. Incident significant wave height at toe of structure from spectral analysis.
8. Incident peak period at toe of structure.
9. Incident mean wave period  $T_{-1,0}$  at toe of structure calculated from spectral analysis.
10. Incident mean wave period  $T_{0,1}$  at toe of structure calculated from spectral analysis.

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11. Spectral width parameter of incident waves (narrowness parameter).
  12. Spectral width parameter of incident waves (broadness factor).
  13. Incident significant wave height from time domain analysis.
  14. Incident  $H_{1/10}$  wave height (average of 1/10 of the highest waves).
  15. Incident  $H_{1/100}$  wave height (average of 1/100 of the highest waves).
  16. Incident mean wave period calculated from zero-downcrossing analysis.
  17. Skewness of surface elevation.
  18. Wave transmission coefficient.
  19. Mean set-up behind breakwater.
  20. Mean wave overtopping discharge per meter structure.
  21. 2% wave run-up height.
  22. Maximum impact force on plate.

Test No.	Cross sec.	h [m]	A <sub>c</sub> [m]	R <sub>c</sub> [m]	Refl. Coef.	H <sub>m0</sub> [m]	T <sub>p</sub> [s]	T <sub>-1,0</sub> [s]	T <sub>0,1</sub> [s]	ε <sub>2</sub>	ε <sub>4</sub>	H <sub>1/3</sub> [m]	H <sub>1/10</sub> [m]	H <sub>1/100</sub> [m]	T <sub>z</sub> [s]	b <sub>1</sub>	C <sub>t</sub>	Mean set-up	q [m <sup>3</sup> /m/s]	R <sub>u,2%</sub> [m]	F <sub>max</sub> [N]
070705a	1	2.30	0.60	0.40	0.18	0.307	2.71	2.41	2.25	0.295	0.564	0.368	0.573	0.357	2.54	0.06	0.039	0.006	1.78E-06	0.250	
110705a	1	2.30	0.60	0.40	0.17	0.374	2.71	2.51	2.36	0.283	0.563	0.451	0.650	0.442	2.67	0.12	0.042	0.010	6.95E-06	0.311	21.1
110705b	1	2.30	0.60	0.40	0.16	0.434	3.05	2.73	2.56	0.286	0.562	0.523	0.753	0.511	2.77	0.12	0.055	0.015	3.79E-05	0.374	44.9
120705b	1	2.30	0.60	0.40	0.17	0.502	3.18	2.93	2.74	0.293	0.574	0.596	0.866	0.576	2.98	0.17	0.065	0.025	2.07E-04	0.413	146.5
120705c	1	2.30	0.60	0.40	0.18	0.307	2.52	2.29	2.16	0.280	0.561	0.375	0.550	0.366	2.38	0.09	0.036	0.006	1.43E-06	0.247	
120705d	1	2.30	0.60	0.40	0.23	0.394	3.85	3.54	3.32	0.298	0.579	0.470	0.664	0.457	3.33	0.20	0.076	0.016	1.57E-05	0.380	61.6
120705e	1	2.30	0.60	0.40	0.19	0.314	3.18	2.92	2.73	0.301	0.581	0.376	0.533	0.365	2.90	0.14	0.053	0.008	1.80E-06	0.301	
130705a	1	2.30	0.60	0.40	0.20	0.433	3.48	3.39	3.17	0.297	0.575	0.520	0.736	0.500	3.47	0.20	0.079	0.018	5.69E-05	0.413	51.6
130705b	1	2.30	0.60	0.40	0.15	0.474	2.61	2.48	2.36	0.261	0.549	0.566	0.739	0.556	2.30	0.15	0.046	0.019	9.56E-05	0.394	43.6
130705c	1	2.30	0.60	0.40	0.16	0.379	2.36	2.25	2.15	0.251	0.533	0.466	0.633	0.462	2.46	0.12	0.035	0.010	1.01E-05	0.307	14.3
130705d	1	2.30	0.60	0.40	0.15	0.533	2.93	2.67	2.53	0.262	0.542	0.633	0.827	0.621	2.41	0.14	0.058	0.028	2.81E-04	0.426	187.3
130705e	1	2.30	0.60	0.40	0.16	0.318	2.09	2.06	1.97	0.245	0.522	0.400	0.583	0.384	1.93	0.11	0.033	0.007	8.60E-07	0.256	
130705f	1	2.01	0.89	0.69	0.14	0.498	2.61	2.52	2.39	0.269	0.559	0.588	0.794	0.582	2.68	0.17	0.041	0.023	1.01E-05	0.465	35.3
140705a	1	2.01	0.89	0.69	0.15	0.424	2.93	2.68	2.52	0.285	0.560	0.504	0.736	0.493	2.73	0.19	0.043	0.016	1.16E-06	0.428	16.1
140705b	1	2.01	0.89	0.69	0.21	0.379	3.48	3.32	3.10	0.303	0.585	0.456	0.677	0.435	3.27	0.21	0.059	0.013	7.21E-07	0.447	25.2
150705a	2	2.30	0.60	0.60	0.16	0.484	2.52	2.42	2.31	0.256	0.541	0.576	0.753	0.569	2.23	0.12	0.042	0.017	2.89E-05	0.381	43.2
150705b	2	2.30	0.60	0.60	0.16	0.375	2.36	2.18	2.08	0.252	0.535	0.460	0.688	0.439	2.21	0.08	0.034	0.008	4.16E-06	0.285	35.8
150705c	2	2.30	0.60	0.60	0.16	0.559	2.71	2.58	2.46	0.264	0.558	0.661	0.877	0.652	2.40	0.16	0.052	0.026	1.06E-04	0.422	89.5
150705d	2	2.30	0.60	0.60	0.17	0.461	2.93	2.65	2.50	0.284	0.565	0.550	0.823	0.525	2.71	0.12	0.049	0.017	3.16E-05	0.399	71.9
150705e	2	2.30	0.60	0.60	0.18	0.403	2.81	2.66	2.49	0.296	0.583	0.485	0.726	0.471	2.55	0.10	0.046	0.012	1.21E-05	0.365	49.4
180705b	2	2.30	0.60	0.60	0.16	0.320	2.09	1.99	1.91	0.243	0.521	0.396	0.520	0.381	2.00	0.10	0.029	0.007	3.27E-07	0.234	
180705c	2	2.30	0.60	0.60	0.18	0.342	2.52	2.33	2.19	0.285	0.565	0.414	0.632	0.399	2.25	0.10	0.037	0.008	1.92E-06	0.280	16.8
180705d	2	2.30	0.60	0.60	0.21	0.421	3.48	3.40	3.19	0.295	0.572	0.507	0.733	0.490	3.52	0.19	0.074	0.016	8.03E-06	0.398	40.3
180705e	2	2.30	0.60	0.60	0.19	0.341	3.33	3.07	2.87	0.302	0.584	0.404	0.562	0.390	3.17	0.14	0.055	0.010	4.57E-07	0.328	
180705f	2	2.01	0.89	0.89	0.13	0.572	2.93	2.68	2.54	0.272	0.560	0.667	0.958	0.653	2.60	0.19	0.047	0.029	1.47E-05	0.523	68.4
190705b	2	2.01	0.89	0.89	0.13	0.650	3.05	2.85	2.69	0.284	0.573	0.752	0.952	0.731	2.88	0.24	0.060	0.040	3.69E-05	0.564	80.0
190705c	2	2.01	0.89	0.89	0.14	0.429	2.44	2.33	2.22	0.258	0.541	0.514	0.712	0.499	2.19	0.12	0.031	0.013	4.60E-07	0.403	
190705d	2	2.01	0.89	0.89	0.14	0.450	2.81	2.70	2.54	0.283	0.559	0.540	0.788	0.521	2.68	0.17	0.042	0.016	1.89E-06	0.456	12.4
190705e	2	2.01	0.89	0.89	0.21	0.396	3.66	3.44	3.21	0.301	0.582	0.473	0.661	0.458	3.38	0.20	0.062	0.013	5.02E-08	0.456	
200705b	2	2.01	0.89	0.89	0.27	0.497	4.06	3.87	3.58	0.316	0.602	0.577	0.739	0.560	3.41	0.24	0.068	0.021	3.55E-07	0.585	
200705c	2	2.01	0.89	0.89	0.14	0.542	3.18	2.98	2.79	0.299	0.587	0.648	0.896	0.630	2.73	0.23	0.057	0.026	8.00E-06	0.513	29.6
200705d	3	2.01	0.89	1.09	0.13	0.645	3.05	2.85	2.69	0.283	0.572	0.741	0.950	0.719	2.85	0.24	0.058	0.040	1.50E-05	0.562	15.7
200705e	3	2.01	0.89	1.09	0.13	0.536	2.71	2.60	2.46	0.277	0.572	0.631	0.870	0.609	2.66	0.19	0.043	0.024	3.19E-06	0.486	
210705c	3	2.30	0.60	0.80	0.16	0.523	2.71	2.59	2.45	0.271	0.560	0.620	0.879	0.597	2.51	0.16	0.051	0.023	2.25E-05	0.408	14.9
210705d	3	2.30	0.60	0.80	0.16	0.614	3.05	2.81	2.66	0.273	0.556	0.714	0.905	0.696	2.74	0.20	0.069	0.037	9.13E-05	0.463	20.7
210705e	3	2.30	0.60	0.80	0.16	0.398	2.44	2.25	2.14	0.253	0.535	0.489	0.674	0.480	2.40	0.12	0.035	0.011	1.81E-06	0.310	
210705f	3	2.30	0.60	0.80	0.17	0.516	3.18	2.90	2.72	0.294	0.576	0.617	0.884	0.601	2.84	0.16	0.064	0.025	2.30E-05	0.418	25.8
220705b	3	2.30	0.60	0.80	0.17	0.467	3.05	2.75	2.58	0.289	0.569	0.565	0.808	0.542	2.63	0.14	0.057	0.017	1.06E-05	0.404	
220705c	3	2.30	0.60	0.80	0.17	0.411	2.93	2.62	2.46	0.290	0.569	0.491	0.719	0.473	2.52	0.13	0.048	0.013	1.61E-06	0.358	
220705d	3	2.30	0.60	0.80	0.28	0.527	4.30	4.01	3.74	0.303	0.587	0.634	0.884	0.618	4.33	0.24	0.100	0.034	7.46E-05	0.492	87.3
220705e	3	2.30	0.60	0.80	0.24	0.442	3.85	3.66	3.42	0.303	0.590	0.529	0.715	0.509	4.25	0.23	0.082	0.021	1.58E-06	0.429	
250705b	4	2.30	0.60	0.80	0.16	0.525	2.71	2.59	2.45	0.272	0.561	0.625	0.879	0.607	2.50	0.17	0.053	0.025	2.24E-05	0.409	24.5
250705c	4	2.30	0.60	0.80	0.16	0.619	3.05	2.81	2.66	0.272	0.555	0.719	0.891	0.701	2.76	0.19	0.072	0.039	9.68E-05	0.471	25.4
250705d	4	2.30	0.60	0.80	0.16	0.401	2.44	2.25	2.15	0.253	0.536	0.493	0.684	0.481	2.42	0.12	0.037	0.011	2.61E-06	0.309	
250705e	4	2.30	0.60	0.80	0.17	0.521	3.18	2.91	2.73	0.294	0.576	0.624	0.892	0.606	2.82	0.16	0.066	0.026	2.69E-05	0.424	13.4
260705b	4	2.30	0.60	0.80	0.17	0.474	3.05	2.75	2.58	0.291	0.569	0.569	0.821	0.546	2.61	0.14	0.057	0.019	1.21E-05	0.403	18.0
260705c	4	2.30	0.60	0.80	0.18	0.416	2.71	2.62	2.46	0.290	0.568	0.495	0.746	0.472	2.55	0.14	0.048	0.013	2.25E-06	0.360	
260705d	4	2.30	0.60	0.80	0.28	0.533	4.30	4.01	3.74	0.303	0.586	0.638	0.893	0.621	4.29	0.23	0.100	0.035	7.07E-05	0.509	50.7
260705e	4	2.30	0.60	0.80	0.24	0.444	3.85	3.65	3.41	0.304	0.590	0.531	0.715	0.509	4.25	0.22	0.082	0.021	2.04E-06	0.431	
270705b	4	2.01	0.89	1.09	0.13	0.654	3.05	2.85	2.69	0.284	0.574	0.756	0.979	0.733	2.81	0.24	0.063	0.042	1.74E-05	0.615	13.8
270705c	4	2.01	0.89	1.09	0.13	0.542	2.71	2.60	2.46	0.276	0.570	0.637	0.868	0.619	2.66	0.20	0.047	0.026	4.64E-06	0.494	