

2018-09-11

Summer School - Tuesday 11 September 2018 - Experimental planning I: Facilities and set-up

Perez-Collazo, C

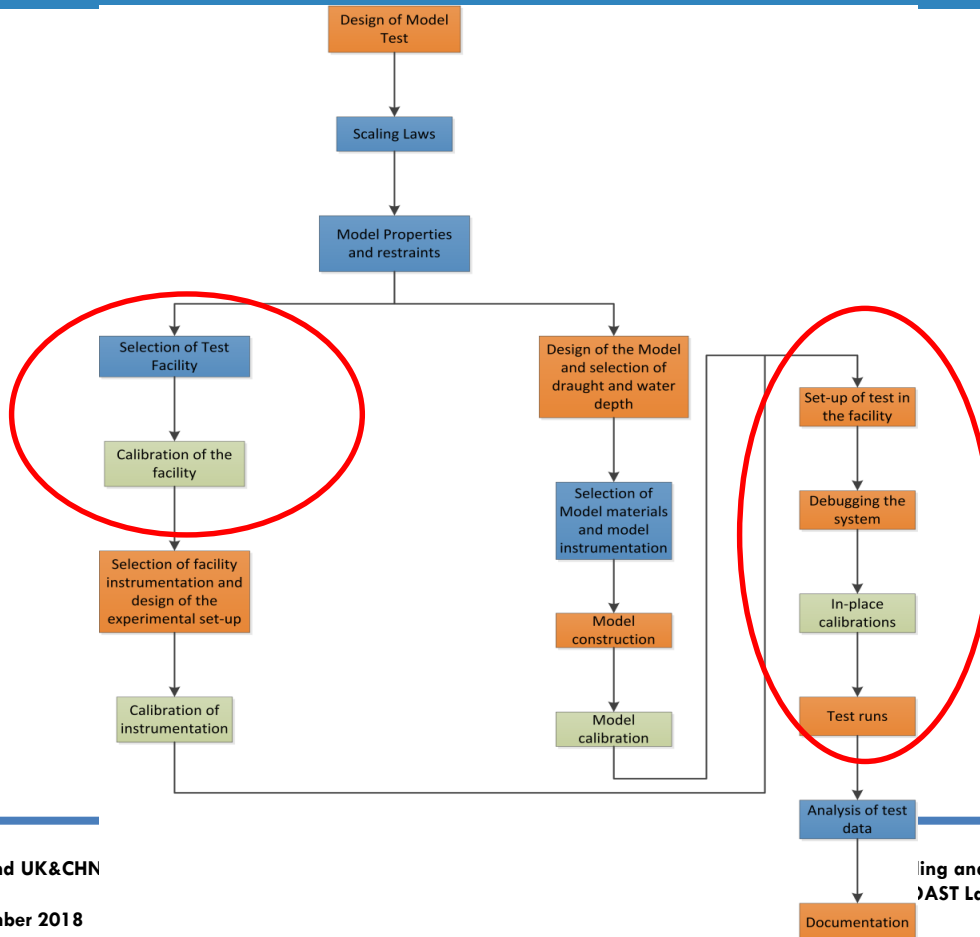
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Experimental planning I: Facilities & set-up

Dr Carlos Perez-Collazo
11th Sep 2018







- Wave generation and absorption
- Basin and flume flow
- Towing tanks
- Blockage effects

- Wave makers
 - Deep water generation
 - Shallow water generation



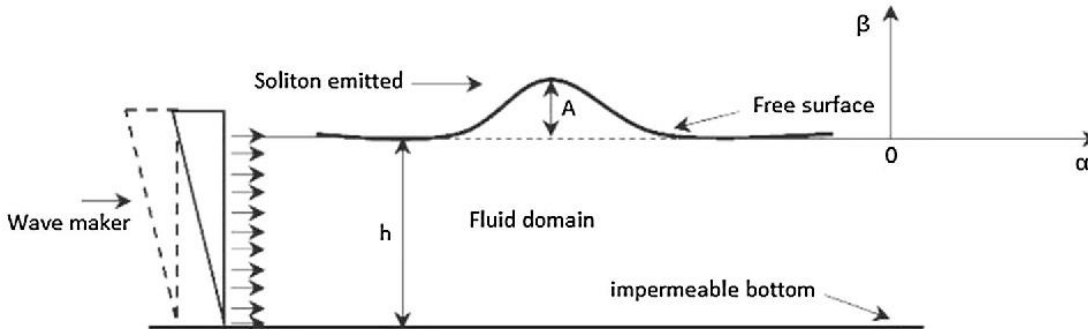


Table 4.1 Biésel transfer functions for four common types of wavemakers

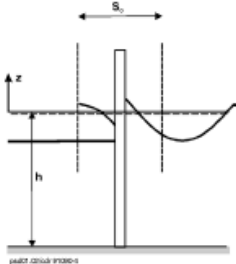
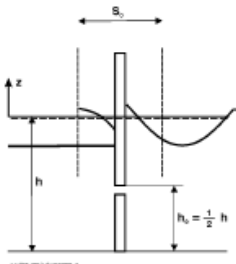
	Piston	$S(z) = S_0$	$\frac{H}{S_0} = \frac{2 \sinh^2(kh)}{\sinh(kh) \cosh(kh) + kh}$
	Elevated Piston	$\begin{cases} S(z) = S_0 & ; (z+h) > h_0 \\ S(z) = 0 & ; (z+h) < h_0 \end{cases}$	$\frac{H}{S_0} = \frac{2[\sinh(kh) - 2 \sinh(kh_0) \sinh(kh)]}{\sinh(kh) \cosh(kh) + kh}$

Image from: DHI. DHI wave synthesizer. User guides: DHI; 2005.

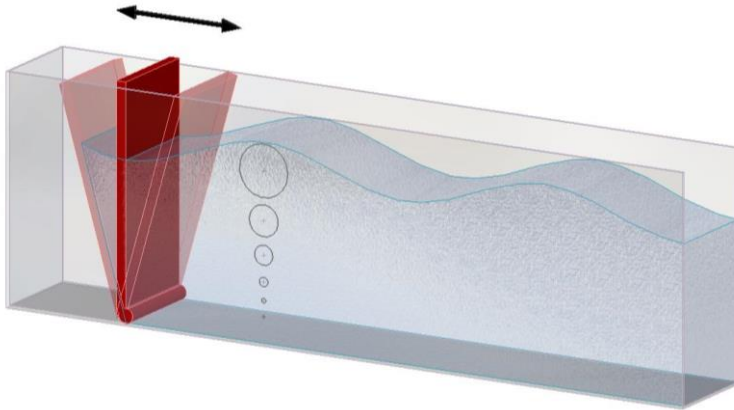
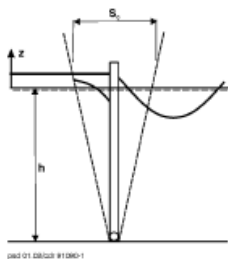


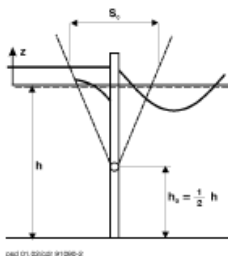
Table 4.1 Biésel transfer functions for four common types of wavemakers



Hinged

$$S(z) = \frac{S_0}{h} (h + z)$$

$$\frac{H}{S_0} = \frac{2 \sinh^2(kh)(1 - \cosh(kh) + kh \sinh(kh))}{kh(\sinh(kh)\cosh(kh) + kh)}$$

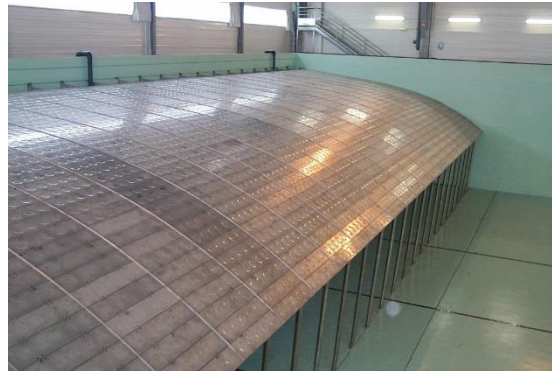


Elevated Hinged

$$\begin{cases} S(z) = S_0 \frac{h + z - h_0}{h - h_0} & ; (z + h) > h_{0o} \\ S(z) = 0 & ; (z + h) < h_0 \end{cases}$$

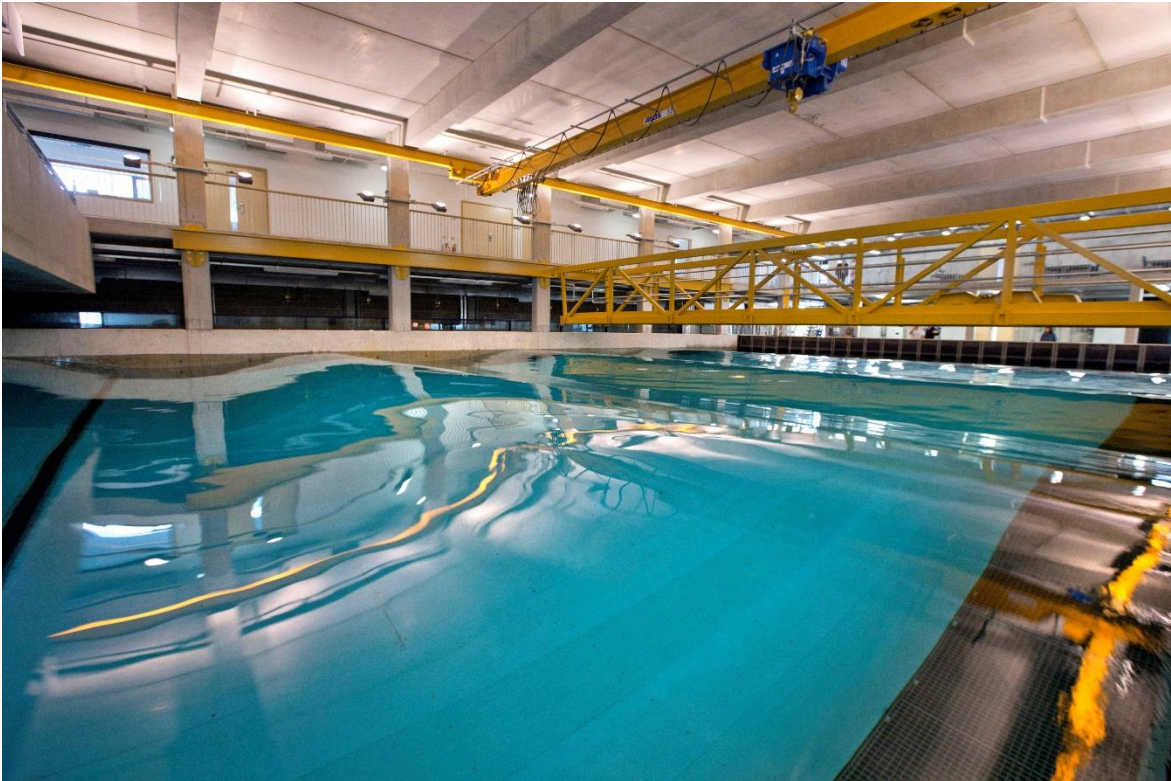
$$\frac{H}{S_0} = \frac{2[\sinh(kh)((h - h_0)k \sinh(kh) - \cosh(kh) + \cosh(kh_0))]}{k(h - h_0)[\sinh(kh)\cosh(kh) + kh]}$$

Image from: DHI. DHI wave synthesizer. User guides: DHI; 2005.



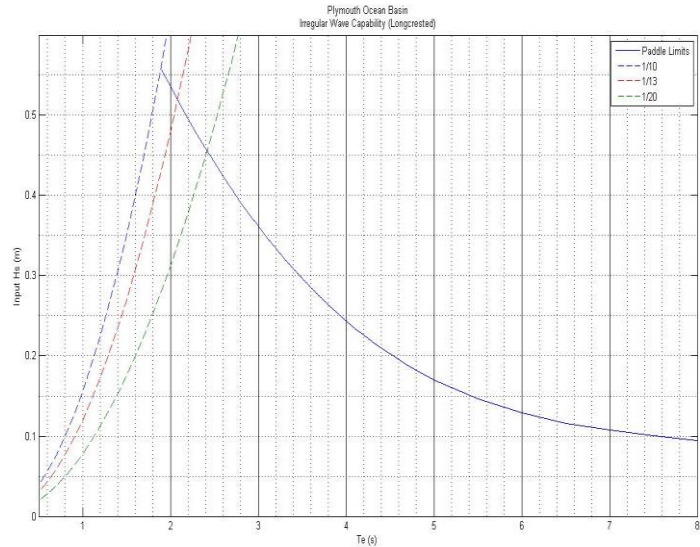
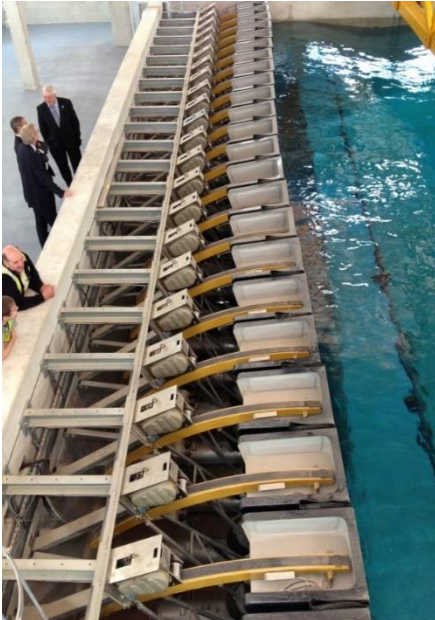
Images from:
<http://www4.e-design.co.uk>

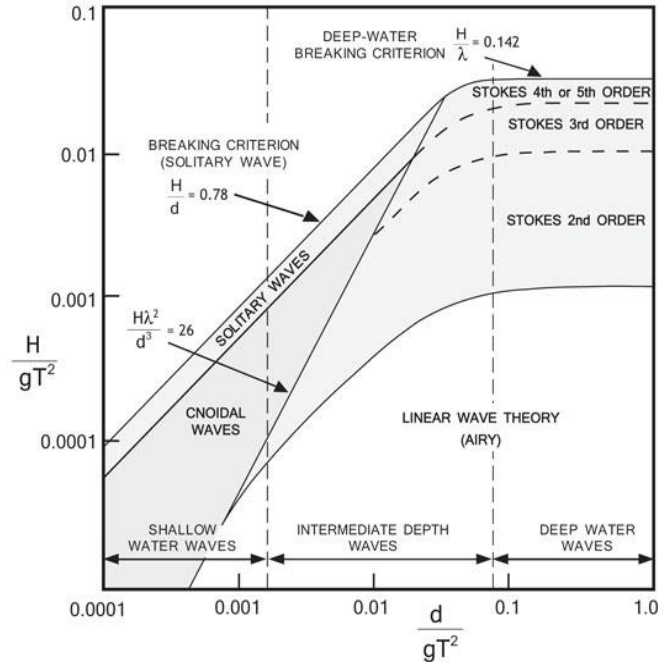












Waves

Model width to tank width $> 5 : 1$

Currents

Cross-section of the model to
cross-section of the channel $< 10\%$.

Test series	TRL Level	Facility	2D-3D	Test duration
Series A: Linear regular waves	1-4	flume-basin	2D	50-100 waves (300 if resonance)
Series B: Non-linear regular waves	3-5	flume-basin	2D	
Series C: Long-crested irregular waves	1-5	flume-basin	2D	1 h full scale or (> 700 waves)
Series D: Spectral shape	2-5	flume-basin	2D-3D	
Series E: Directional long-crested waves	2-5	Basin	3D	
Series F: Short-crested waves	2-5	Basin	3D	
Series G: Combined waves and ocean currents	2-5	flume-basin	2D-3D	test specific
Series R: Repeatability	1-5	flume-basin	2D-3D	

Test series	TRL Level	Facility	2D-3D	Test duration
Series H: Long-crested	2-5	flume-basin	2D-3D	3 hrs (full scale)
Series I: Long-crested and directional	3-5	flume-basin	2D-3D	
Series J: Short-crested	3-5	basin	3D	
Series K: Combined wave and ocean current	3-5	basin	3D	
Series R: Repeatability	2-5	flume-basin	2D-3D	

