|  |  |
| --- | --- |
| **C:\Users\sjamet\Documents\Logo LHEEA-CNRS.png** |  |

**Wave Generation Report**

**Target waves and measured waves**

**LHEEA team**

May 2018

**SOMMAIRE**

Contenu

[1 Summary 3](#_Toc514148950)

[1 Marinet2 OSCILLA campaign 3](#_Toc514148951)

[2 Test Plan 3](#_Toc514148952)

[2.1 Regular waves 3](#_Toc514148953)

[2.2 Long-crested (uni-directional) irregular waves 3](#_Toc514148954)

[2.3 Short-crested irregular waves 3](#_Toc514148955)

[3 Calibration certificates 4](#_Toc514148956)

[3.1 Wave gauges 4](#_Toc514148957)

# 1 Summary

This report gives all the details on wave generation for a specific campaign

# 1 Marinet2 OSCILLA campaign

# Test Plan

## Regular waves

Specifications for regular wave generation.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scale Factor: | 10 |  |  |  |  |  |  |  |
| Waves | | | Full Scale | | | Model Scale | | |
| Case | Location | | Hs | Tp | Vw | Hs (mm) | Tp | Vw |
| WC-R1 | - | | 0.3 | 3 | - | 30 | 0.9 | - |
| WC-R2 | - | | 0.3 | 4 | - | 30 | 1.3 | - |
| WC-R3 | - | | 0.5 | 5 | - | 50 | 1.6 | - |
| WC-R4 | - | | 0.5 | 6 | - | 50 | 1.9 | - |
| WC-R5 | - | | 0.5 | 8 | - | 50 | 2.5 | - |
| WC-R6 | - | | 1 | 10 | - | 100 | 3.2 | - |
| WC-R7 | - | | 1 | 14 | - | 100 | 4.4 | - |
| WC-R8 | - | | 1 | 16 | - | 100 | 5.1 | - |

## Long-crested (uni-directional) irregular waves

Specifications for irregular waves: Bretschneider spectra

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scale Factor: | 10 |  |  |  |  |  |  |  |
| Waves | | | Full Scale | | | Model Scale | | |
| Case | | Location | Hs | Tp | Vw | Hs (mm) | Tp | Phase sets |
| WC-LC1 | | - | 0.75 | 4.5 | - | 75 | 1.4 | 1 |
| WC-LC2 | | - | 0.75 | 10.5 | - | 75 | 3.3 | 1 |
| WC-LC3 | | - | 1.75 | 5.5 | - | 175 | 1.7 | 1 |
| WC-LC4 | | - | 1.75 | 9.5 | - | 175 | 3.0 | 1 |
| WC-LC5 | | - | 1.75 | 13.5 |  | 175 | 4.3 | 1 |
| WC-LC6 | | - | 3.75 | 8.5 | - | 375 | 2.7 | 1 |
| WC-LC7 | | - | 4.8 | 8 | - | 480 | 2.5 | 3 |

## Short-crested irregular waves

Specifications for irregular waves: Bretschneider spectra

Directional spreading in for with

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scale Factor: | 10 |  |  |  |  |  |  |  |
| Waves | | | Full Scale | | | Model Scale | | |
| Case | | Location | Hs | Tp | Vw | Hs (mm) | Tp | Vw |
| WC-SC1 | | - | 0.75 | 4.5 | - | 75 | 1.4 | - |
| WC-SC2 | | - | 0.75 | 10.5 | - | 75 | 3.3 | - |

# Frequency wave spectra

From previous spectrum specifications, wave components are considered only when

* they fit into the wavemaker frequency range [0 ; 2] Hz
* they corresponds to energy above 1% of the energy at the peak of the spectrum

With these simple rules, energy is generated within 3% of the input spectrum. The target energy spectrum and amplitude distribution are given in



Figure Normalized energy spectrum (left) and amplitude distribution (right)

## Target distance

When the measurements are made far away from the wavemaker, it is best to start the wave generation of the different components according to their group velocity in order to obtain the same arrival time at the specified location.

Parameter: target location where the measurements are made (distance from the wavemaker)

Principle:

* because of the cut in energy (see above), the spectrum have a maximum frequency that correspond to the slowest wave
* the slowest wave (group velocity ) arrives at the target location at time
* the other waves generation starts only after time



Figure 2 Exemple (repeat period 128 s, energy threshold 1%)

Important information:

* the wavefield will arrive at the target location at time . Before that, no waves.
* Energy between and is computed and compared to the expected energy.
* a high enough number of zero-crossing waves is needed between and



Figure 3 Modification of the amplitude spectrum (left: magnitude, right: phase)

# Directional Wave spectra

## Available spreadings

The wavemaker at LHEEA has the following library of directional spreading

* for
* for

## spreading

The first one is plotted for a mean direction and for the following values of the n parameter: 5, 10 and 15.



Figure 4 Directional spreading for various values of the n parameter

## spreading

The second one is plotted for a mean direction and for the following values of the s parameter: 10, 20 to 50.



Figure 5 Directional spreading for various values of the s parameter

## Width of the directional distribution

The directional spreading may be estimated by the Half Width at Half Maximum. Most of the generated waves directions are contained within the range . The values are reported in the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| s coefficient | 10 | 20 | 30 | 40 | 50 |
| HWHM in degrees | 30 | 21 | 17 | 15 | 13 |
| n coefficient | 5 | 10 | 15 | 20 | 25 |

## Equivalence

The distribution is the same as the when we take , as long as is not too small.

# Calibration certificates

## Wave gauges