WAMIT Frequency-Domain Hydrodynamic Simulation Setup

POHOWEP - Performance Optimization of a Hybrid Offshore Wind-Wave Energy Platform
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Package 2: WAMIT_ Hydrodynamic_Setup
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1. Overview

This document describes the numerical setup used for frequency-domain hydrodynamic simulations of the reference ITI Energy barge and the modified barge incorporating four Oscillating Water Columns (OWCs).
The simulations were conducted using WAMIT to characterize the hydrodynamic behavior of the floating platforms and generate numerical coefficients for subsequent dynamic-response analyses.
The corresponding geometry definition files are included in the dataset.

2. Numerical Simulation Configuration

The following parameters have been verified for the both blatform simulation.

Table 1: Simulation parameters in WAMIT.

Parameter	ITI Energy barge	Four-OWC barge
Software	WAMIT 7.5	WAMIT 7.5
Numerical method	High-order panel method	High-order panel method
Water depth	Infinite	Infinite
Wave periods	301	301
Period range	0.1–30.1 s	0.1–30.1 s
Period increment	0.1 s	0.1 s
Wave heading	0°	0°
Number of WAMIT bodies	1	1
Enabled motion modes	6	6
Geometry file	Barge-Test.gdf	Barge_4M_Test.gdf
Symmetry flags	ISX=1, ISY=1	ISX=1, ISY=1
Vertical centre of gravity	−0.281768 m	−0.542 m

The barge simulation used WAMIT input files defining the numerical configuration, wave conditions, floating-body properties and geometry. Radiation and diffraction calculations were enabled.
The corresponding simulation parameters for the four-OWC configuration are documented in its own input files and should be verified before inclusion in the final dataset.

3. Hydrodynamic Outputs

The WAMIT simulations were used to obtain frequency-dependent hydrodynamic characteristics, including:

- Added-mass coefficients.
- Radiation-damping coefficients.
- Wave-excitation forces and moments.
- Hydrostatic restoring coefficients.
- Response amplitude operators (RAOs), where calculated using the corresponding response model.

These outputs support the comparison of the hydrodynamic behavior of the reference and hybrid floating platforms.

4. Dataset Organization and Reproducibility

The dataset contains WAMIT input and numerical output files organized by platform configuration.

The geometry definition files are included with the corresponding simulations to facilitate interpretation and reuse. The input files specify the numerical settings and simulation conditions, while the output files contain the resulting hydrodynamic information.

The accompanying README.md identifies the files, explains the folder structure and provides instructions for accessing the numerical results.

Software requirement: WAMIT is proprietary software and is not distributed with this dataset.