1 Main Idea

2D, wave generator, FSI, homogenous or non-homogenous ship/boat, free surface between fluid and air, gravity

2 Experimental and numerical study of the vertical motions of a bulk carrier and a Ro–Ro ship in extreme waves s40722-015-0019-1

Some reports from B C. Guedes Soares c.guedes.soares@centec.tecnico.ulisboa.pt 1 Centre for Marine Technology and Ocean Engineering (CENTEC), Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco País, 1049-001 Lisbon, Portugal cruise vessels encountering rogue waves, such as Grand Voyager (February 2005) (Bertotti and Cavaleri 2008), Norwegian Dawn (April 2005) (Didenkulova et al. 2006) and MS Louis Majesty (March 2010) (Cavaleri et al. 2012), confirm that ships might be exposed to extreme environment conditions during its lifetime, including encounters with abnormal waves, whose damaging effects have already been pointed out by Faulkner and Buckley (1997).

The wave generator is fully computer controlled and a software is implemented which enables the generation of transient wave packages, deterministic irregular sea states with predefined characteristics as well as tailor-made critical wave sequences (Clauss and Kühnlein 1996; Clauss and Schmittner 2005). The technique has been established to reproduce a large variety of wave sequences such as single abnormal waves as well as groups of rogue waves embedded in irregular sea states to investigate the response of floating structures to an extreme, but realistic, wave environment (Clauss et al. 2004).

I could use the model of wave in this paper to simulate the real situation.

3 Experiments and computations of solitary wave interaction with fixed, partially submerged, vertical cylinders s40722-019-00137-8

wave presented but finite difference ,3D, rigid vertical cylinder submerged in water

4 Experiments and calculations of cnoidal wave loads on a flat plate in shallow-water /s40722-014-0007-x

vertial flat plate, more experimental

5 Simulation of floating structure dynamics in waves by implicit coupling of a fully non-linear potential flow model and a rigid body motion approach s40722-014-0006-y

2D potential flow floating

The floating idea comes here

6 PREDICTION OF GLOBAL WHIPPING RESPONSES ON A LARGE CRUISE SHIP UNDER UNKNOWN SEA STATES USING AN LSTM BASED ENCODER DECODER MODELOMAE 202 4 126186

The document presents a comprehensive study on predicting global whipping responses on a large cruise ship under unknown sea states using an LSTM (Long Short-Term Memory)based encoder-decoder model. It highlights the significance of accurately predicting vertical bending moments for ship safety and introduces a novel approach employing a machine learning model trained on a dataset including motion data and vertical bending moment history from numerical simulations. The study verifies the model's effectiveness under both known and unknown sea states and explores a data mixing strategy to enhance prediction accuracy for unknown conditions. This approach demonstrates potential in improving ship safety by enabling accurate predictions of critical structural responses under varying sea conditions.

7 Viscous fluid–flexible structure interaction analysis on ship springing and whipping responses in regular waves

The document titled "Viscous fluid–flexible structure interaction analysis on ship springing and whipping responses in regular waves" explores the dynamics of ship responses to wave-induced forces through a comprehensive computational fluid dynamics (CFD) and finite element analysis (FEA) approach. This study employs a two-way fluid-structure interaction (FSI) methodology to predict ship motions, wave loads, and hydroelastic responses in regular waves, focusing on the springing and whipping phenomena that are critical for ship structural integrity. The research presents an in-depth analysis of the ship's global motions, vertical accelerations, and wave-induced vertical bending moments, highlighting the capability of the CFD-FEA co-simulation method to replicate complex flow phenomena and ship responses accurately.

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