



Osaka University

Graduate School of Engineering
Department of Naval Architecture & Ocean Engineering

Hydro-Seminar

by Lab. of Floating-Body Dynamics in Waves

The speaker in the 36th Hydro-Seminar is

Professor Yonghwan Kim

Department of Naval Architecture & Ocean Engineering
Seoul National University, Seoul, Korea

Date: Friday, 27 January, 2017

Time: 15:00 – 16:00

Venue: S1-311 (Lecture room, 3F of S1 building)
Suita Campus, Osaka University



A Practical Procedure for Prediction of Extreme Loads on Offshore Mooring Lines

Abstract

Prediction of extreme hydrodynamic loads on offshore structures is a crucial element for the design of mooring lines. There are two main problems in the prediction of extreme hydrodynamics responses: A huge number of ocean environmental conditions and nonlinearity of hydrodynamic characteristics. To find the sets of ocean environment conditions, we need to consider all possible combinations of wave statistics, wind and current. The number of such combinations can be easily the order of ten thousands even for practical project. Furthermore, the responses of offshore structure and mooring cables can behave in nonlinear manner. Particularly the slowing-varying motion in waves is the second-order dominant problem. That is, linear analysis is obviously not enough.

In this presentation, a practical multi-level procedure is proposed to predict the extreme hydrodynamics responses in myriad ocean conditions. First, to filter out the ocean environmental conditions with insignificant hydrodynamic loads and responses, a new pre-screening method is proposed. This prescreen is based on quasi-steady approach for response analysis and eigen-function approach for extreme statistical analysis. This approach is mathematically profound but is very efficient and fairly accurate. In our procedure, a concept of design-wave method is proposed for the prediction of extreme responses as an alternative method of the direct simulation of loads and motion coupled with mooring. It is shown that this approach provides an excellent accuracy as the number of considered wave scenarios increases. Finally, the direct simulation coupled between motion and mooring lines can be applied for validation purpose. A few applications are introduced, proving significant practicality.

The Speaker: Professor Yonghwan Kim

Professor Kim graduated Seoul National University for his bachelor and master degrees in 1987 and 1989, and got a PhD degree at MIT in 1998. He worked at Daewoo Shipbuilding and Marine Engineering Co., ABS and MIT, and he joined Seoul National University in 2004. Currently he is a chair of the Department of Naval Architecture and Ocean Engineering at Seoul National University, and the director of two research centers and two education programs. His primary research areas are the seakeeping problems, such as motion responses of ships and offshore structures, sloshing, ship hydroelasticity, green-ship technology, and naval hydrodynamics.

He has been chairing ITTC Seakeeping Committee for six years, and he is editor-in-chief of Journal of Advanced Research in Ocean Engineering. He is the member of Korean Academy of Engineering and Fellow of RINA. Also he was chosen as the Distinguished Visiting Fellow of Royal Academy of Engineering, UK, in 2015-2016. He was the awardee of Young Researcher Award, a very prestigious award of Korean Academy of Engineering.



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