DEPARTMENT *of* CIVIL and ENVIRONMENTAL ENGINEERING

NUS National University of Singapore | Centre for Offshore Research and Engineering Faculty of Engineering

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You are cordially invited to a seminar organized by Centre for Offshore Research and Engineering (CORE) and Department of Civil and Environmental Engineering

"Hydrodynamic Response of a Compliant Modular Large Floating Hydrocarbon Storage Facility"

By

Zhang Chi

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Date: **Thursday, 19 September 2019**

Time: **4:30 pm to 6.00 pm**

Venue: **EA #06-03**
Faculty of Engineering,
National University of Singapore

Abstract

Constructing large floating structures (LFS) provides an alternative solution for the coastal cities to fight against sea level rising problem. Conventional large floating structures are continuous, thus introduces hight loads on the structure. An innovative compliant modular LFS (CMLFS) concept has been proposed recently to overcome this problem. By introducing compliant mooring system and adopting modular design, the concept can reduce the hydrodynamic loads on the LFS significantly. The concept is applied through a floating hydrocarbon storage facility (FHSF), composed of modular floating hydrocarbon storage tanks (FHST) and barges.

Hydrodynamic performance of the LFS is of importance at the initial design. Intensive studies have been conducted to evaluate the hydrodynamic and hydroelastic responses of continuous LFS. A few researchers focus on modular LFS through hydroelastic theory assuming modules are very close with small motion. Very little research has been conducted on the hydrodynamics of CMLFS. Complexities, such as fluid resonances in the narrow gaps and large number of bodies, make it difficult to apply either hydrodynamic or hydroelastic method to solve the dynamic response. Therefore, a comprehensive experimental and numerical investigation are desired to validate such novel concept. In addition, to conduct numerical analysis, efficient numerical methods should be adopted and validated through experiments.

In this presentation, a general research path on solving hydrodynamic responses of the FHSF is firstly proposed. Following the path, dynamic response of a single FHFT under waves is investigated and the design of the FHST is optimized. Then, a subsystem of the FHSF is proposed to further explore the hydrodynamic responses through experiments and a time-domain hydrodynamic analysis were conducted. Effect of hydrodynamic interactions and fluid resonance is explored. In the numerical analysis, A state-space model is introduced, and it is validated to increase the efficiency of simulation significantly. Finally, future work to explore the hydrodynamic responses of the entire FHSF system will be briefly introduced.

About the speaker

Zhang Chi is currently a Ph.D. student in the Department of Civil & Engineering, National University of Singapore. He completed his B.Eng (Naval Architecture and Offshore Engineering) from the Wuhan University of Technology (WUT) in 2013. He pursued his postgraduate study in WUT and complete M.Eng in 2016. His M.Eng research topic is the hydroelastic and fatigue of a wide-flat river-sea-going ship. He joined the research team of project Multipurpose Floating Structures as a research Engineer in NUS afterward. Meantime, he is doing Ph.D. study under CEE. His current research focuses on hydrodynamic responses of compliant modular large floating structures for ocean space utilization.

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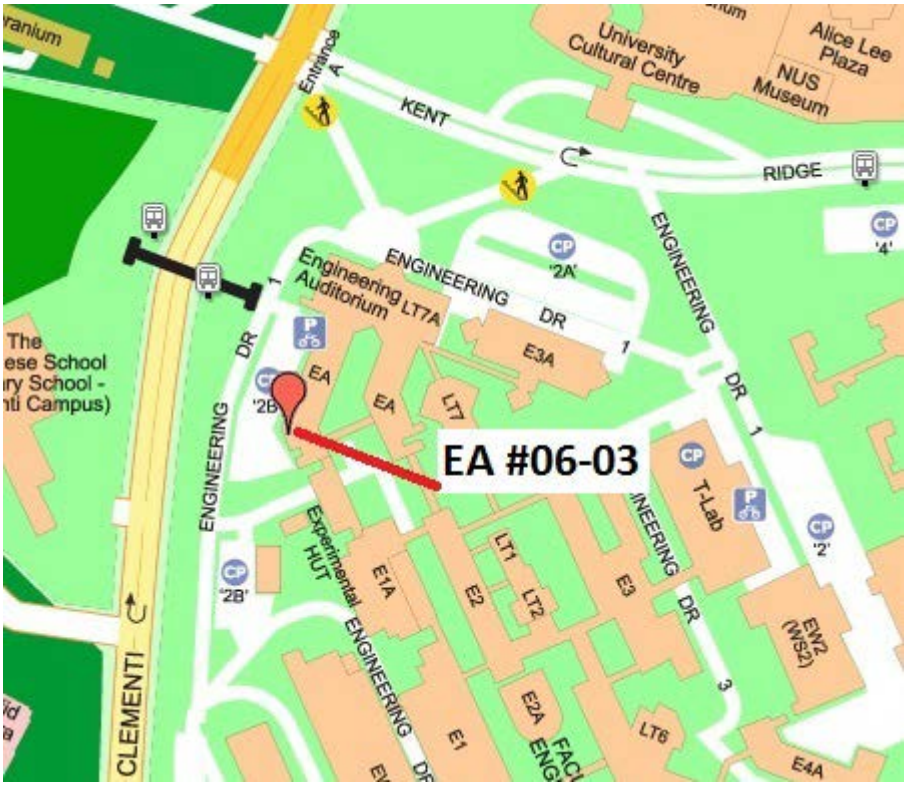
Location



Pre-registration is not required. All are welcome and admission is free