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WEBINAR TALK ON

REDUCING HULL RESISTANCE USING AIR INJECTION FOR LNG VESSEL WITH FREE BALLAST SYSTEM

BEM Approved CPD: 2 **Ref No : IEM23/HQ/133/T (w)**

Organised by:
Marine Engineering and Naval Architecture Technical Division, IEM

Presented by:

Prof Dr Adi Maimun bin Abdul Malik

6 MAY 2023, SATURDAY
11.30AM

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SYNOPSIS

Ballast water discharge may introduce and transport unwanted marine organisms to the discharging area. Marine Environment Protection Committee (MEPC) of International Maritime Organization (IMO) considers ballast water as hazard due to possibly having a negative impact on the receiving ecosystems. Many researchers have investigated possible solutions for management of ballast water to minimize the risks, including ballast free system. However, the application of ballast free system has created a new issue on hull resistance. On the other hand, many techniques have been developed to reduce the frictional resistance employing air injection system. The need to design an advanced LNG ship environmentally friendly and save on fuel consumption cost has brought the application of air-injection ballast free system. This research aims to determine the effect of ballast free system on resistance of LNG ship and evaluate how the air-injected pressured bubbles reduce ship resistance hence improve the system performance. To achieve the objectives, the total hull resistance of LNG model was determined by simulation using ANSYS CFX with build in Reynolds Average Navier-Stokes (RANS) code. The simulation was limited to Fr=0.17 to Fr=0.22 at ballast draft. It was found that, ballast free system alone and air-injected ballast free system has increased and reduced the total bare hull resistance by 34.21% and 37.64% respectively. The former increment of the resistance is due to the additional wetted surface area of the ballast free tanks and pipes whilst the latter reduction is a consequence more friction-free bottom hull surface area due to air bubble layers. These finding can be a guideline for more efficient ship design and powering estimation as well as future improvement from the current works.

SPEAKER'S PROFILE

Dr Adi Maimun obtained his B.Sc in Naval Architecture from the University of Strathclyde, Glasgow in 1983. He joined Universiti Teknologi Malaysia (UTM) as a tutor the same year. He later return to Strathclyde University for his Masters and Ph.D. in Marine Technology and obtained his degrees in 1985 and 1993 respectively.

Dr Adi Maimun is currently serving as Professor of Naval Architecture at the Dept. of Aeronautics, Automotive and Ocean Engineering, Faculty of Mechanical Engineering. He was Head of Marine Laboratory (1986-1989), Head of Panel for Marine Technology (1999-2000), Head of Departmentfor Marine Technology (2000-2007) and the Deputy Dean (Development) for the Faculty of Mechanical Engineering (2007-2011). Head of Marine Hydrodynamics Research Group, UTM (2010-2021).

Dr Adi Maimun specializes mainly in the field of Marine Vehicles/Structures Dynamics using CFD, AIS, Time domain simulations and experimental work. He had taught, conducted research and consultancy work in the said field and had published over 100 papers in conferences and journals.

Dr. Adi Maimun is currently a Fellow Member of the Royal Institution of Naval Architects (UK) and a Chartered Engineer (UK). He had served as committee member for a number years for the Malaysia Joint Branch (MJB) of Royal Institution of Naval Architects (RINA) and Institute of Marine Engineers Science and Technology (IMarEST). He is currently the Chairman (2022-2023) for RINA-IMarEST MJB (Southern Chapter) and Chairman (2019-2022) for Ship & Marine Technical Committee, Department of Standards Malaysia. In the international field he had served in the International committee board for the conferences of MARTEC (since 2002), APHYDRO (since 2002) and OMAE (2008). Local organizing chairman for MARTEC 2004 and APHYDRO 2010.Malaysia Correspondent member for International Ship and Offshore Structures Congress (ISSC) (2015-2016).