

Editors: Cornel Panait, Eugen Barsan, Aida Bulucea, Nikos Mastorakis, Charles Long



# ADVANCES in MARITIME and NAVAL SCIENCE and ENGINEERING

3rd International Conference on MARITIME  
and NAVAL SCIENCE and ENGINEERING (MN 410)

Constantza Maritime University, Constantza, Romania, September 3-5, 2010

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## **Preface**

This year the 3rd International Conference on MARITIME and NAVAL SCIENCE and ENGINEERING (MN '10) was held at the Constantza Maritime University, Constantza, Romania, September 3-5, 2010. The conference remains faithful to its original idea of providing a platform to discuss marine navigation, safety and security of maritime shipping, sea transport and transportation technology, hydrography, geodesy and marine cartography, geomatics and GIS in maritime applications, electronic chart systems ecs and ecdis, inland, river and pilot navigation systems, presentation of navigation-related information, route planning and monitoring; passage plan, integration of navigational systems, ins/ibs, e-navigation, GPS, galileo, GNSS and radio based navigational systems, telematics in maritime transportation, ships routing and associated protected measures, maritime traffic engineering, systems of control, guidance and monitoring of traffic, VTS, manoeuvrability and hydrodynamics of ships, colregs, anti-collision, radar equipment, ARPA, AIS, VDR, maritime search and rescue issues, human factors, marine accidents, human errors, crew resource management, safe manning, stress and fatigue, navigational systems - the end user experience, marine simulation; full mission bridge, navigational simulators, maritime education and training; model courses validation etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: [www.worldses.org/indexes](http://www.worldses.org/indexes) as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





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## Plenary Lecture 1

### Indoor Ambiences in Spanish Merchant Ships



**Professor Jose A. Orosa**

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University of A Coruna

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**Abstract:** The Spanish National Institute of Statistics reports that fatal accidents are substantially higher in commercial fishing fleets than in merchant shipping, although there are a significant percentage of Spanish merchant ships involved. According to casualty statistics, more than 60% of all engine room fires are initiated by hot spots. Oil leakages are usually not properly identified and corrected, a problem that must be related to marine engineers' fatigue under extreme working conditions. In this regard, datasheets and standards do not provide clear information about the ambience suitable for the engine room, its design conditions, and the role of marine engineers in preventing work-related risks. Formal safety assessment is the first step in a new approach to maritime safety that involves using risk and cost-benefit assessment techniques to assist the decision making process. A new air conditioning control system based on general thermal comfort levels is a subsequent solution that will be presented.

**Brief Biography of the Speaker:**

Jose Antonio Orosa Garcia is a PhD in Marine Engineering and graduated in Marine Engineering and Naval Architecture from the University of A Coruna. His research is related to indoor ambiances and energy saving. In the recent past, he has participated in the International Energy Agency Annex 41 and collaborated with the University of Porto in research on energy saving and work risk prevention in indoor ambiances. Presently, he is Professor of HVAC and Head of the Department of Energy and Marine Propulsion of the University of A Coruna (Spain). He is a member of the Society of Naval Architects and Marine Engineers (SNAME) and ASHRAE.

## Plenary Lecture 2

### Oncoming Revolution for Ship Propulsion - Fuel Cells



#### Professor Deniz Unsalan

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**Abstract:** Fuel cells are electrochemical devices that produce electric current while oxidation of a fuel takes place. A classical fuel cell uses molecular hydrogen as the fuel and atmospheric air as the oxidant, and water vapour is the output. Since the efficiency of a fuel cell is not limited by the second law of thermodynamics and does not produce carbon dioxide, fuel cells are the candidate power systems of the future.

The history of fuel cells dates to mid-19th century. Interest has been revived in early 1960's as power sources for spacecraft. Several types of fuel cells have been developed in the recent decades, and applications to other areas have been made. The main problems for fuel cells are centered around the technical problems related to the storage of molecular hydrogen. However, hydrogen can also be in-situ obtained from a conventional hydrocarbon fuel by a reforming process.

Main marine applications of fuel cells for today have been for the air-independent propulsion of submarines and urban waterway transportation. However, the advantages offered by them has induced researchers to study fuel cells as power sources for ship propulsion and auxiliary services, which is the main topic of this presentation. Advantages to be obtained by the use of fuel cells from a ship designers and operators point of view are outlined, and as a candidate case, the concept for the power plant of a hypothetical frigate is explained.

#### **Brief Biography of the Speaker:**

Deniz Unsalan was born in Izmir, Turkey in 1953. He was educated in Ankara and Istanbul, receiving his undergraduate education from the Turkish Naval Academy in 1973. He served in the Turkish Navy ships before and after his postgraduate education. He received "Master of Science" and "Mechanical Engineer" degrees from the Naval Postgraduate School at Monterey, California in 1980. He was a British Council Scholar at the University of Newcastle upon Tyne, U.K. between 1982-1984. He received his Doctor of Philosophy degree in Naval Architecture in 1993 from the Istanbul Technical University.

He was a lecturer in Marine Engineering at the Turkish Naval Academy between 1987 and 1994, Assistant Professor at Istanbul Technical University Maritime Faculty between 1994 and 1996, Associate Professor at Near East University between 1996-2003, at Dokuz Eylul University Institute of Marine Sciences and Technology between 2003-2009. He became a full Professor in 2006. Currently he is a Professor of Marine Engineering at the Piri Reis University in Istanbul, Turkey.

## Plenary Lecture 3

### Combined Complex Maritime Simulation Scenarios for Reducing Maritime Accidents caused by Human Error



#### Professor Eugen Barsan

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**Abstract:** Given the increasing prevalence of automated systems on board ships, it is important that the human element is considered throughout their design, implementation and operational use. Automation can be beneficial to operators of complex systems in terms of a reduction in workload or the release of resources to perform other onboard duties. However, it can also potentially be detrimental to system control through increasing the risk of inadvertent human error leading to accidents and incidents at sea.

A team of researchers from our Constantza Maritime University had participated at a study, together with master students, which wants to release the dangerous situation on sea based on human factors. In this scope has been used a full mission ship handling simulator with three full bridges and liquid cargo handling simulators, developing applications in navigation and ship handling area, with different grades of difficulty and risk. These applications brings the future deck officers in usually situations on board, forced to use the present navigation technology and study their options and reactions in these cases, focus on situations with risk of errors, human errors, appearance. Students had to navigate and maneuver very large vessels, as tankers, LPG or LNG vessels. Scenarios used in the research were very complex, combining near coastal navigation with piloting and anchoring or mooring operations. All these actions were done in real time and in different weather conditions.

Results of the study revealed the importance and benefits of a long term training of future deck officers, based on the use of modern and complex marine simulators, and the constant progress of the achievements of the trainees.

#### **Brief Biography of the Speaker:**

Dr. Eugen BARSAN graduate Naval Academy in Constantza, Romania in 1982. From 1982 to 1991 he sailed as deck officer in the Romanian merchant fleet, on different types of maritime ships. From 1991 his activities were related with the maritime education and training, teaching different nautical sciences at Constantza Maritime University. He completed is PhD in Surface Transport in 2004 defending his Doctoral thesis on "Oil Spill Prevention and Response along the Romanian Coastline" at Bucharest Technical University. In the last 18 years was appointed as Head of the Nautical Department, Vice Dean of the Maritime Transport Faculty of Constantza Maritime University. Now he is the Vice Rector for research and international cooperation at Constantza Maritime University. Dr. Barsan's primary areas of interest are: radar navigation, navigation and ship handling simulation, maritime safety and security, waterborne transport. Many of his research projects deal with optimization of maritime transport, analysis of human errors in navigation and ship handling, maritime traffic safety and control, man-machine interface in waterborne transport. He is member of the International Association of Maritime Universities (IAMU) and of the International Maritime simulation Forum (IMSF). Acting also as Director of the Constantza Maritime University Simulation Center, he is managing the development of the maritime simulation facilities and supervising the research activities that are applying simulations and on site experiments.

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