#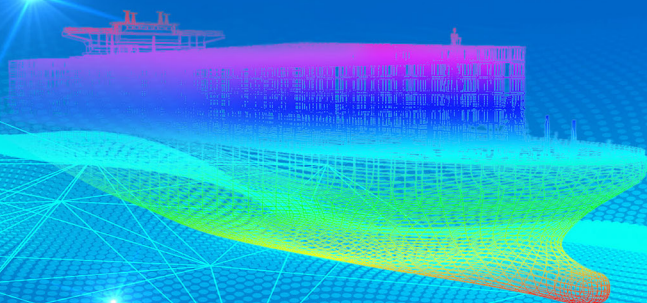 The 5th International Conference for Innovation and Cooperation of Naval Architecture and Marine Engineering (ICNAME 2021)

& The 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships

Program Guide

November 16-17, 2021

Harbin, China

Sponsors: China Association of the National Shipbuilding Industry
Marinet Industry Association of Russia
International Innovation and Cooperation in Naval Architecture
and Marine Engineering Alliance (ICNAME)

Organizers: Harbin Engineering University
Wuhan University of Technology
Satakunta University of Applied Sciences
Tokyo University of Marine Science and Technology
Seoul National University
Norwegian University of Science and Technology
Russian University of Transport
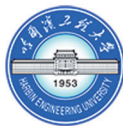
As the rapid development in the ship technologies, to accelerate the innovation process of cutting-edge technologies in terms of low-carbon, digitized, intelligentized, and autonomous ships, and deepen global science and technology cooperation and jointly promote the development in naval architecture and marine engineering, The 5th International Conference for Innovation and Cooperation in Naval Architecture and Marine Engineering (ICNAME 2021) & the 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships will be held on 16th and 17th November, 2021 to invite experts and scholars of well-known universities, institutions and enterprises from China, Russia, France, Norway, Japan, Korea, Singapore, etc., to share their expertise on Green Ships, Autonomous Ships, and Smart Ships. Besides meeting of ICNAME council, the high-level forums on green ship technologies and autonomous navigation technologies will also be organized during the conference, and the establishment of Joint Lab of Smart and Autonomous Ships will be discussed.

The conference will be sponsored by China Association of the National Shipbuilding Industry, Marinet Industry Association of Russia, International Innovation and Cooperation in Naval Architecture and Marine Engineering Alliance (ICNAME), and co-organized by Harbin Engineering University, Wuhan University of Technology, Satakunta University of Applied Sciences, Tokyo University of Marine Science and Technology, Seoul National University, Norwegian University of Science and Technology, Russian University of Transport.

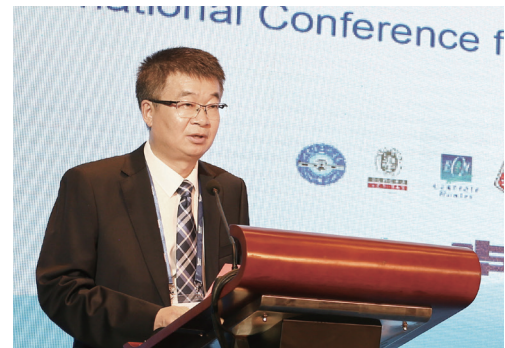We do sincerely to welcome you to join the conference.

Yours Sincerely,

Guihua XIA
Chairman of ICNAME

Contents

Introduction of ICNAME

With Harbin Engineering University (China) as the major initiator and support from Dalian University of Technology(China), the University of Strathclyde (Great Britain), State Marine Technical University of St. Petersburg (Russia), Bureau Veritas (France), and China Classification Society (China), ICNAME shall be registered as a Non-Governmental organization devoted to the exchanges of research to share their achievements in naval architecture, ocean and marine engineering and promotion of extensive cooperation as well as the development of science and technology. ICNAME is organized exclusively for international cooperation in naval architecture, ocean and marine engineering in the form of promoting mutual cooperation, exploration and exchanges, resource and knowledge sharing and collaborative development among members, with a hope to advance the innovation and development of technologies in naval architecture, ocean and marine engineering as well as the application and translation of research achievements to the marine industry.

Guihua XIA

Chairman of ICNAME, vice-president of HEU Professor XIA Guihua has been engaged in the research on Control Technology of Naval Architecture and Ocean Engineering, mainly, on the field of ship motion modeling and simulation, intelligent ship technology, ship navigation and control simulation system, image processing technology, and intelligent robot control, etc. As the project leader, he organized and completed more than ten national and provincial scientific research projects, and won 13 prizes awarded by Ministry of Science and Technology, Ministry of Education, or Heilongjiang Province, including 1 Second-prize of National Science and Technology Progress, 3 First-prize and 3 Second-prize of Science and Technology Progress of Ministries or Province. In 2021, he was awarded the Ho Leung Ho Lee Science and Technology Progress Award.

Agenda of ICNAME 2021

<table>
<tr><td colspan="5">The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
Opening Ceremony
16th November, 6:00-6:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040
Presided by: Guihua XIA, Chairman of ICNAME</td></tr>
</table>

Date	Time (GMT±0)	Topic	Speaker	Organization and Position
16th November	6:00-6:05	Opening Speech	Yan GAO	Chair of the University Council, Harbin Engineering University, China
	6:05-6:10	Opening Speech	Alexander Pinskiy	Chairman, Board of Supervisors, Marinet Industry Association of Russia
	6:10-6:15	Opening Speech	Miao XU	General Manager Assistant, China State Shipbuilding Corporation Limited, China
	6:15-6:20	Opening Speech	Dacheng GUO	Chairman, China Association of the National Shipbuilding Industry, China
	6:20-6:50	Keynote Speech: Safety Technology and Solutions to Application of Cell Power on Ships in China	Xiaofeng LUO	Director of Wuhan Rules & Research Institute, China Classification Society, China

<table>
<tr><td colspan="5">The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
Preliminary Meeting for the Establishment of the International Smart and Autonomous Navigation Ships Joint Lab
16th November, 7:00-8:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040
Co-Chairmen: Alexander Klimov, Rector of Russian University of Transport
Guihua XIA, Chairman of ICNAME;
Zuyuan LIU, Vice President of Wuhan University of Technology;
Representative of Norwegian University of Science and Technology</td></tr>
</table>

Date	Time (GMT±0)	Topic	Speaker	Organization and Position
16th November	7:00-7:10	Introduction on the Smart and Autonomous Navigation Ships Joint Lab	Alexander Klimov	Rector, Russian University of Transport, Russia
	7:10-8:45	Self-Introduction by Representatives of Initiating Universities		
	8:45-8:50	Initiate the Proposal to Establish the Smart and Autonomous Navigation Ships Joint Lab		

The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
The 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships
16th November, 9:00-12:40 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040
Co-Chairmen: **Alexander Klimov**, Rector, Russian University of Transport
Guihua XIA, Chairman of ICNAME

Date	Time (GMT±0)	Topic	Speaker	Organization and Position
16th November	9:00-9:05	Speech	Alexander Klimov	Rector, Russian University of Transport, Russia
	9:05-9:10	Speech	Guihua XIA	Chairman of ICNAME, China
	9:10-9:20	Speech	Heike Deggim	Head of Maritime Safety Department, International Maritime Organization
	9:20-9:50	Developments of Maritime Autonomous Surface Ships in China	Xinping YAN	Academician, the Chinese Academy of Engineering; Professor, Wuhan University of Technology, China
	9:50-10:20	Development of Research on Smart and Autonomous Ship Technology in Finland	Janne Lahtinen	Professor, Satakunta University of Applied Sciences, Finland
	10:20-10:50	Recent Development on MASS in Japan	Etsuro Shimizu	Professor, Tokyo University of Marine Science and Technology, Japan
	10:50-11:00	Coffee Break		
	11:00-11:30	KASS Project and Validation Plan for an Autonomous Ship	Jin Kim	Korea Research Institute of Ships and Ocean Engineering (KRISO), Korea
	11:30-12:00	Smart and Autonomous Vessel Development in Norway	Nesvåg, Odd Magne	Technical Responsible, DNV, Norway
	12:00-12:30	a-Navigation Development in Russia	Alexander Pinskiy	Chairman, Board of Supervisors, Marinet Industry Association of Russia
	12:30-12:40	Closing Remarks		

The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
The 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships
17th November, 6:00-9:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040
Chairman: **Etsuro Shimizu**, Tokyo University of Marine Science and Technology
Co-Chairman: Representative of Wuhan University of Technology

Date	Time (GMT±0)	Topic	Speaker	Organization and Position
17th November	6:00-6:30	Virtual-real Interaction Testing of Intelligent Ships	Jialun LIU	Associate Professor, Wuhan University of Technology, China
	6:30-7:00	The Research Work on the Intelligent Ship	Qidan ZHU	Professor, Harbin Engineering University, China
	7:00-7:30	BV Rules Development for Smart Ship	Laurent Verney	Bureau Veritas, France
	7:30-8:00	Remote Support, Distributed Maritime Capabilities	Hans Petter Hildre	Professor, Norwegian University of Science and Technology, Norway
	8:00-8:10	Coffee Break		
	8:10-8:40	Introduction of Research on Autonomous Ships in NMRI	Ryohei Sawada	Professor, National Institute of Maritime, Port and Aviation Technology, Japan
	8:40-9:10	Autonomous Navigation in Marine Port Waters	Dmitry Studenikin	Vice-Rector, Admiral Ushakov Maritime State University, Russia
	9:10-9:40	Towards the Safe	Bolbot Victor	Professor, Aalto University, Finland
	9:40-9:50	Closing Remarks		

The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
High-level Forum on Green Ship Technology
16th November, 7:00-9:10 (GMT+0, London Time)
Virtual Meeting (ZOOM): 893 8090 0700 https://zoom.us/j/89380900700
Chairman: **Yanjun LI**, Dean of College of Power and Energy Engineering at Harbin Engineering University
Co-Chairman: Representative of Wuhan University of Technology

Date	Time（GMT±0）	Topic	Speaker	Organization and Position
16th November	7:00-7:30	Progress and Challenges in High Efficiency and Clean Combustion of Marine Engines Fueled with Ammonia	Zunhua ZHANG	Professor, Wuhan University of Technology, China
	7:30-8:00	On the Safe Navigation of Energy-Efficient Ships in Adverse Conditions	Shukui LIU	Lecturer, Nanyang Technological University, Singapore
	8:00-8:30	An Introduction on Green Ship Technologies towards IMO Upcoming Regulations	Jie ZHANG	Associate Professor, Harbin Engineering University, China
	8:30-9:00	Tendencies in the Evolution of Green Shipping	Carlos Guedes Soares	Professor, University of Lisbon, Portugal
	9:00-9:10	Closing Remarks		

The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
High-level Forum on Green Ship Technology
17th November, 6:00-8:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 893 8090 0700 https://zoom.us/j/89380900700
Chairman: **Xide CHENG**, Deputy Dean of School of Energy and Power Engineering at Wuhan University of Technology
Co-Chairman: Representative of Harbin Engineering University

Date	Time（GMT±0）	Topic	Speaker	Organization and Position
17th November	6:00-6:30	Fuels for Zero-Carbon ship and Ammonia Combustion in Marine Dual-Fuel Engines	Long LIU	Professor, Harbin Engineering University, China
	6:30-7:00	Zero-Emission Fuel Application of Autonomous Vessel Routing in Northern Sea Route(between Russia and South Asia)	Sewon Kim	Assistant Professor, Sejong University, Korea
	7:00-7:30	Alternative Marine Fuels Review and Methanol Study: Towards IMO's Decarbonization of the Maritime Transport Sector	Haifeng LIU	Professor, Tianjin University, China
	7:30-7:40	Coffee Break		
	7:40-8:10	Maritime Forecast to 2050: An Energy Transition Outlook for Shipping	Tore Longva	Principal Consultant, DNV, Norway
	8:10-8:40	BV Rules Development for Green ship	Laurent Courregelongue	Director of Environment Department, Bureau Veritas, France
	8:40-8:50	Closing Remarks		

Innovation& Cooperation in Naval Architecture&Marine Engineering Alliance
(ICNAME 2021)
Youth Forum on the Innovation in Naval Architecture and Marine Engineering
17th November, 9:00-12:30 (GMT+8, Beijing Time)
ZOOM meeting: 829 1755 7720; Link: https://zoom.us/j/82917557720
Co-Chairs: Guoyong JIN, Harbin Engineering University
Xueqian ZHOU, Harbin Engineering University
Songzuo LIU, Harbin Engineering University
Tian ZHOU , Harbin Engineering University

Date	Time (GMT+8)	Topic	Speaker	Organization and Position
17th November	9:00-9:30	Green Design and Construction in the Naval Engineering Sector	Jose Luis Mantari	National University of Engineering, Peru, Professor
	9:30-10:00	Distributed Affine Formation Maneuver Control of Marine Surface Vehicles	Cheng Zhu	Harbin Engineering University, PhD Student
	10:00-10:30	VibroacousticModellingof Novel Structures Using Wave and Finite Element Methods	Yi Yang	The University of Auckland, Senior Research Fellow
	10:30-11:00	Quasi-LPV-based composite anti-disturbance dynamic positioning control of vessels	Jie Zhao	Harbin Engineering University, PhD Student
	11:00-11:30	Methane Slip Reduction From LNG-fuelled Ships in Order to Achieve Low-carbon Emissions	MajedShreka	Harbin Engineering University, PhD Student
	11:30-12:00	Subcarrier Modulation Identification of Underwater Acoustic OFDM	Yanan Liu	Harbin Engineering University, PhD Student
	12:00-12:30	Acoustic Detection of Slowly Moving Targetsin High Clutter	Roee Diamant	University of Haifa, Associate Professor

Origanizing Committee Members

- **Harbin Engineering University**

Harbin Engineering University(HEU) is initially the Naval Engineering Department in the PLA Military Engineering Institute founded in 1953. It became an independent institute named Harbin Shipbuilding Engineering Institute in 1970, and was renamed Harbin Engineering University in 1994.

The main campus of HEU is situated in Harbin, an important central city in Northeast China, with a total area of 1,383,500 square metres (or 138 hectares). HEU consists of 22 colleges and has established more than 40 scientific research institutions and over 150 scientific research and teaching laboratories, with disciplines in science, engineering, humanities, law, economics, management, and education. At present, more than 32,000 students and scholars are studying in 14 PhD programs, 32 Master degree programs, 63 Bachelor degree programs, and 15 postdoctoral research centers .

In the field of shipbuilding, ocean and nuclear engineering, HEU achieves fruitful results in underwater robots, ship anti-rolling, marine power, integrated navigation, underwater acoustic positioning, nuclear power simulation and large ship simulation. It has become one of the main education and research bases for Chinese shipbuilding engineering and ocean engineering with a good academic reputation worldwide.

- **Wuhan University of Technology**

Wuhan University of Technology (hereafter referred to as WUT) is a national key university under the direct administration of the Ministry of Education. It is one of the first batch of universities which have entered the national "211 Project" and the national "Double Top" Plan for Promoting the Development of World-class Universities and Disciplines. WUT is jointly constructed by the Ministry of Education and the Ministry of Transport. It is also the largest university inside the Ministry of Education in talents cultivation for building materials, transportation and automobile, WUT has become an important base for the cultivation of high-level scientific talents and technological innovation for the three major industrial sectors.

The University has three main campuses, namely, the Mafangshan Campus, the Yujiatou Campus and the South Lake Campus, with a total occupying land area of 267 hectares. Currently, WUT has over 5,400 staff and faculty members, over 36,000 undergraduates, over 18,000 postgraduates and Ph.D. students and about 1,700 international students. It owns 25 academic schools, 4 National Technology Innovation Bases and 4 modern libraries with a collection of 3.2953 million books. Since 2000, WUT has been awarded 23 National Science and Technology prizes, ranking in the forefront of all Chinese colleges and universities. In 2019, WUT was listed in Times Higher Education World University Rankings, QS Asia University Rankings, U.S.News Best Global Universities Rankings and ShanghaiRanking’s Academic Ranking of World Universities.

Since the funding of New China, WUT has cultivated more than 600,000 senior professionals. Over the past decade, the first-time employment rate of graduates has remained above 95%, and about 55% of total employed graduates join the world's Top 500 enterprises and emerging industries.

Over the years, WUT has made rapid development by following the spirit of "Sound in Morality, Broad in Learning and Pursuing Excellence"; and the principle of "Take the students' cultivation as our essence, and take academic development as our priority";. The university focuses on the lofty ideal of building an excellent university to win worldwide recognition and admiration and exercises the educational concept of "implementing excellent education, nurturing excellent talents and creating an excellent life". Guided by the WUT Charter approved by the Ministry of Education, WUT is committed to the modernization of the governance system and capability, aiming to rank among the world-class universities with distinctive features.

- **Satakunta University of Applied Sciences**

SAMK is a multi-disciplinary and an international higher education institute of approximately 6,000 students and 400 employees. In its operating area on the west coast of Finland, SAMK is a significant creator of experts as well as a developer, a propeller of internationalisation and a promoter of entrepreneurship.

SAMK provides experts and developers for the region and promotes internationality and entrepreneurship in Satakunta.

The economic and industrial structure of the region requires SAMK to be able to offer extensive education and research opportunities in the fields of health care and social services , business administration, and technology.

SAMK profiles itself as an industrial higher education institution.

SAMK has the responsibility to produce customizable competence to meet the modern and versatile needs of working life in the region of Satakunta and the neighbouring areas, and in the chosen fields all over Finland.

SAMK's slogan sums up all this: Think Future.

- **Tokyo University of Marine Science and Technology**

Tokyo University of Marine Science and Technology(TUMSAT), as the only university specialized in ocanography in Japan, is developing education and research activities, based on the motto " Voices from the Ocean", to focusing its efforts since the merger on fulfilling its mission to help Japan develop as a maritime nation and play a role in its contributions to the international community. The aim of TUMSAT is to form an internationally outstanding center for marine education and research in order to develop specialists who will play leading roles in industry, expecially focusing on promoting and advancing global scientific research in the maritime field, comprehensively covering the environment, resources and energy.

- **Seoul National University**

Seoul National University (SNU) honors the ideals of liberal education and aims to teach students a lifelong love of learning that will form the basis for continuous personal growth. At the same time it is committed to preparing students to work and live in an increasingly competitive global environment. As South Korea's first national university, has 15 Colleges, 12 Professional Graduate Schools 27 Colleges & Schools 5,533 Faculty 31,378 Students 5,610,723 Library Holdings. Graduates have long served as public servants in key positions of the Korean government. In teaching, research, and public service, Seoul National University continues to set the standard of excellence.

The mission of Seoul National University in the twenty-first century is to create a vibrant intellectual community where students and scholars join together in building the future. As Korea's leading research university, Seoul National University is committed to diversifying its student body and faculty, fostering global exchange, and promoting path-breaking research in all fields of knowledge.

- **Norwegian University of Science and Technology**

NTNU is a university with an international focus, with headquarters in Trondheim and campuses in Ålesund and Gjøvik.

NTNU has a main profile in science and technology, a variety of programmes of professional study, and great academic breadth that also includes the humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities.

- **Russian University of Transport**

Moscow State University of Railway Engineering (MIIT) is the oldest institution of higher technical education in Russia founded in 1896. Today MIIT is the largest scientific and academic complex in Russia, the all Russian leader in the field of training and retraining of specialists and scientific personnel for transport and transport construction.

As of January 1, 2013 the overall number of students exceeded 118 thousand including those enrolled in programs of higher professional education – about 45 thousand people; and programs of secondary professional education – over 19 thousand people.

There are four academies in the University (Academy of Integrated Safety and Security, Academy of Transport Medicine, Russian Academy of Railway Engineering, and Russian Open Transport Academy), eight Institutes (Humanitarian Institute, Institute of International Transport Communications, Institute of Track, Construction and Structures, Russian-German Institute, Institute of Transport Engineering and Management Systems, Institute of Management and Information Technologies, Institute of Economics and Finance, Institute of Legal Studies), Research Institute of Transport and Transport Construction, four Departments (Evening department, Department of pre-University education, Department of academic staff professional development, Department of scientific personnel), Moscow College of Railway Transport, Gymnasium, Medical College.

There are 24 University branches in 22 constituent entities of Russian Federation which offer programs of higher and secondary professional education.

MIIT offers training along the following lines:

Higher professional educational training is carried out in more than 60 majors and specializations;

Secondary professional training in 32 study programs (9 aggregate training areas);

134 blue collar job training programs.

Graduates major in various fields of transport, transport construction, economics, finance, management, customs, marketing, advertising, humanitarian activities, etc.

The University is the main centre of the transport industry in the field of continuing education. MIIT carries out 480 continuing professional education programs. Up to 50 thousand executives, experts and workers in the field of transport, transport construction and other areas of national economy undergo retraining and participate in professional development programs in MIIT and its branches. MIIT is one of six Russian establishments of higher education licensed to carry out Master of Business Administration (MBA) program.

Introduction of the Addressors

Openning Ceremony

Name: Yan GAO
Position: Chair of the University Council
Organization: Harbin Engineering University, China

Name: Alexander Pinskiy
Position: Chairman of the Supervisory Board of the Industry Association MARINET, Chairman of the Board of trustees of the Foundation of the National Technology Initiative, Director of a-Navigation Promotion Center MARINET RUT, Development Manager of Steor
Organization: Russian University of Transport, a-Navigation Promotion Center MARINET RUT

Name: Miao XU
Position: General Manager Assistant
Organization: China State Shipbuilding Corporation Limited, China

Name: Dacheng GUO
Position: Chairman
Organization: China Association of the National Shipbuilding Industry, China

The 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships

Name: Alexander Klimov
Position: Rector
Organization: Russian University of Transport, Russia

Name: Guihua XIA
Position: Chairman of ICNAME, vice-president of HEU
Organization: Harbin Engineering University, China

Name: Heike Deggim
Position: Head of Maritime Safety Department
Organization: International Maritime Organization

Introduction of the Presenters

Name: Alexander Pinskiy

Position: Chairman of the Supervisory Board of the Industry Association MARINET, Chairman of the Board of trustees of the Foundation of the National Technology Initiative, Director of a-Navigation Promotion Center MARINET RUT, Development Manager of Steor

Organization: Russian University of Transport, a-Navigation Promotion Center MARINET RUT

Email: al@marinet.org

Report Theme: a-Navigation Development in Russia

Major Research Directions: Since 2015 coordinates MARINET Working Group of the National Technology Initiative, a long-term state program designated as one of the priorities of State policy by Russian President Vladimir Putin in his Address to the Federal Assembly in December 2014.

In 2019 was elected as a Chairman of the Board of trustees of the Foundation for support of the projects of the National Technology Initiative (Foundation of the National Technology Initiative).

In 2021, as the leader of Autonomous and Remote Navigation Trial Project (ARNTP) firstly opened wide usage of autonomous navigation of merchant ships, he was appointed as Director of a-Navigation Promotion Center MARINET RUT established in pursuance of the order of the President of Russia by Minister of Transport of Russian Federation.

Summary of Report: In 2021, the group of Russian companies is completing the world's largest trail project on autonomous navigation in real conditions (ARNTP). Based on its results, in December 2020, Russian government has started a national experiment on the trial operation of autonomous vessels under the Russian flag. Within it, any shipping company is able to equip its vessels under the Russian flag with autonomous navigation systems and operate them in their regular activities as part of a national experiment.

The report will present the methodology and key results of the ARNTP, examples of the trial operation within the project, current developments in technology, regulation and training of autonomous navigation in Russia.

Name: Bolbot Victor

Position: Postdoctoral Researcher

Organization: Aalto University

Email: victor.bolbot@aalto.fi

Report Theme: Towards the safe autonomous navigation

Major Research Directions: Safety analyses of complex and advanced marine systems; Ship cybersecurity; Novel autonomous systems design; Educational needs for next generation autonomous shipping

Summary of Report: Aalto University belongs to one of the top universities worldwide and aims at being one of the world leaders in the industry 4 revolution. The marine technology group at Aalto has actively participated in a series of projects related to autonomous shipping, such as Älyvesi, Design for Value, Sea for Value, ECAMARIS and AutoMare, with the objective of developing safe design solutions in the context of autonomous shipping. In this presentation, the main research findings from Aalto university related to the autonomous shipping and safe navigation are provided. Based on the research findings, recommendations for ensuring the safe autonomous navigation are generated.
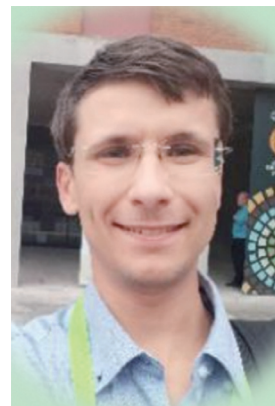
Name: Carlos Guedes Soares
Position: Distinguished Professor
Organization: Centre for Marine Technology and Ocean Engineering (CENTEC), Instituto Superior Técnico, Universidade de Lisboa
Email: c.guedes.soares@centec.tecnico.ulisboa.pt
Topic of Speech: Tendencies in the Evolution of Green Shipping
Major Research Areas: Several research topics within Naval Architecture and Ocean Engineering
Summary of Speech: An overview is provided of some measures to implement and reinforce green shipping

Name: Dmitry Studenikin
Position: Vice-Rector
Organization: Admiral Ushakov Maritime State University
**Email:** dm.studenikin@mail.ru
Report Theme: Autonomous Navigation in Marine Port Waters
Major Research Directions: 1.Mathematical methods of fuzzy logic;
2.Stochastic approaches to assessing the reliability of navigational information;
3.Neural networks in maritime mobile object motion control.
Summary of Report: Admiral Ushakov Marine State University continuously conducts research work to improve the automation level of seagoing ships and the level of port technical equipment. In recent years, complexes of technical solutions have been developed to solve the problem of autonomous navigation in the constrained port water area.

Admiral Ushakov Marine State University has created the autonomous navigation concept in the seaport. The concept has formed the basis of the autonomous navigation project assuming technical implementation of the comprehensive infrastructure solution to control autonomous ships in the seaport of Novorossiysk up to 2026. Including technical solutions for ship, shore, and marine components. The deputy Prime Minister of the Russian Federation on 27 September 2021 approved the passport of the project.
S. Kondratiev, V. Senchenko, D. Studenikin
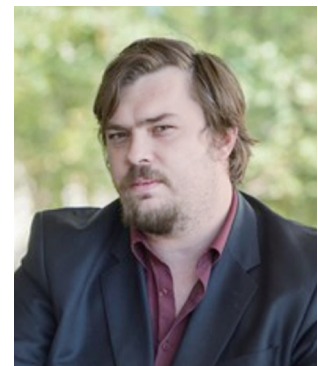
Name: Etsuro Shimizu
Position: Professor
Organization: Tokyo University of Marine Science and Technology
Email: shimizu@kaiyodai.ac.jp
Report Theme: Recent Developments on MASS in Japan
Major Research Directions: Etsuro SHIMIZU was received the Ph.D. degree of Control Engineering from Tokyo Institute Technology in 1999. He is a professor of Tokyo University of Marine Science and Technology. From March 2005 to March 2006, He was a visiting professor of Norwegian University of Science and Technology. His current research interests include nonlinear control theory, its application to marine systems, regulation and legal issues related to maritime autonomous surface ships.
Summary of Report: Recently, research and development of maritime autonomous surface ships are actively carried out in the world including Japan. In this presentation, I will introduce major trends in research and development on MASS technologies in Japan, and will talk what the author considers to be the technological issues and necessary research and development items.

Name: Haifeng Liu
Position: Professor
Organization: State Key Laboratory of Engines, Tianjin University
Email: haifengliu@tju.edu.cn

Report Theme: Alternative marine fuels review and methanol study: Towards IMO's decarbonization of the maritime transport sector

Major Research Directions: Prof. Haifeng Liu has made the outstanding contributions to innovative theoretical and experimental investigation on spray and combustion in internal combustion engines for high efficiency and low emissions. Meantime, he also made significant contributions to spray and combustion by various low-carbon or zero-carbon fuels in engines.

Summary of Report: In all technologies of ship CO_2 emission reduction, the highest CO_2 emission reduction potential is attributable to alternative fuel use. In this report, on one hand, to comprehensively provide the state-of-the-art on clean alternative marine fuels in the marine transport sector, the following 4 parts were introduced, including the various alternative marine fuels, the existing challenges and barriers facing the widespread of clean alternative marine fuels, contingency options for decarbonizing the shipping sector, and the influential selection criteria for the uptake of clean alternative marine fuels. Then, we will answer 2 questions based on a bibliometric analysis: how long has the landscape of cleaner alternative marine fuels research evolved? & what are the current research hotspots and evolutionary trends in cleaner alternative marine fuels?

On the other hand, methanol is considered as one of the most prospective potential carbon neutral fuels in future, but it is hard to be used in compression ignition engines due to its awful auto-ignition property, low viscosity and thus the low reliability. Compared with spark ignition engines, compression ignition engines have higher thermal efficiency and torque. Therefore, the application of methanol in compression ignition engines has more advantages than spark ignition, but the usage also meet some challenges. Firstly, how to improve fuel properties of methanol to meet the needs of high-pressure common-rail direct-injection system were studied based on different fuel tests, including the increase of fuel viscosity, auto-ignition property, anti-wear agent, corrosive, etc. Secondly, the application of methanol in high-pressure direct-injection compression ignition engines was tested preliminarily on a heavy-duty six-cylinder engines, and the test focused on low-load in the current. Thirdly, how to keep the stable methanol combustion as using high-pressure common-rail direct-injection system was analyzed based on advanced optical diagnostics, and found that the temperature control in the key factor to keep stable auto-ignition and subsequent combustion. Fourthly, the toxicity of methanol to typical cells was measured.

Finally, it can be concluded that methanol has the potential to replace diesel fuel or HFO in compression ignition engines to reach carbon neutralization in the future development in marine engines towards IMO's decarbonization.

Name: Janne Lahtinen
Position: Senior Lecturer
Organization: Satakunta University of Applied Sciences
Email: janne.lahtinen@samk.fi

Report Theme: Digitalization of maritime operations

Major Research Directions: Intelligent fairway infrastructures; Human-centric design; The knowledge base of stakeholders; Remote pilotage; Future construction of situational awareness

Summary of Report: Future maritime operations will merge with the conventional shipping decades to come. The average lifespan of a keel laid today is thirty years. Therefore, manned vessels will co-exist with various levels of autonomy in the same environment. With autonomous vessels, decision-making mechanisms migrate ashore while many stakeholders lean on information based on traditional technologies. Undoubtedly, for many, radar and relative referencing tools will maintain gravity in decision making long to come. New technologies allow novel construction of shared situational awareness in fairways adding value to all fairway users. Lack of understanding contextuality and the need for information has hindered the utilization of new ways to meet old goals. Environmentally and financially sustainable development requires hand-in hand maritime.

Name: Jialun LIU
Position: Associate Professor
Organization: Wuhan University of Technology
Email: jialunliu@whut.edu.cn
Report Theme: Virtual-real Interaction Testing of Intelligent Ships
Major Research Directions: Modelling and testing of intelligent ship motion control
Summary of Report: With the advances of research and development in intelligent and autonomous ships, the need for testing technology for intelligent navigation of ships is becoming increasingly urgent. To meet the demands for testing of intelligent navigation for ships, this report summarized the current research status and practical experience of virtual testing technologies and methods for intelligent connected vehicles, analyzed the advantages and problems of various testing technology methods for traditional ships, and pointed out the construction requirements of testbeds for ships. Accordingly, the objects, contents, challenges, and response methods of testing for intelligent navigation of ships were analyzed. The virtual-real interaction testing method was put forward. Scenario definition, scenario library composition, scenario element composition, and optimized and accelerated testing methods of the virtual-real interaction testing was sorted out. A virtual-real interaction system for testing system was designed. Major scientific issues of testing technology development were pointed out. The testing platform of virtual-real interaction were constructed. The effects of key technologies such as the establishment of navigation scenario library and testing standards, environment perception and scenario generation, fusion modeling, and human-machine interaction on the construction of testing platforms were analyzed.

Name: Jie ZHANG
Position: Associate Professor
Organization: Harbin Engineering University
Email: jiezh@hrbeu.edu.cn
Report Theme: An Introduction on Greenship Technologies towards IMO upcoming Regulations
Major Research Directions: Marine hydrodynamics, Shipping GHG emission reduction technologies
Summary of Report: During MEPC 76 in June 2021, the IMO adopted amendments to MARPOL Annex VI, introducing EEXI and CII as new regulations. The requirements will enter into force at 1st of January 2023 and is proposing technical challenges to shipping industry. The presentation will begin from introduction of upcoming EEXI and CII regulations. And then review the relevant Greenship technologies for retrofitting of existing ship to comply with EEXI and CII, with comments on advantages and drawbacks of those technologies. In addition, a technical procedure for retrofitting of existing ship is suggested. In the end, the speaker will also discuss the way ahead for the further development of the regulations and technical trends in IMO GHG emission reduction.

Name: Jin Kim
Position: Head / KASS Project Office
Organization: KRISO
Email: jkim@kriso.re.kr
Report Theme: Maritime Autonomous Surface Ship
Major Research Directions: Korea Autonomous Surface Ship Project
Summary of Report: This presentation introduces a recently launched Korean national R&D program for an Autonomous Surface Ship. The R&D program, named KASS(Korea Autonomous Surface Ship Project) consist of 4 core technologies, which contain 13 R&D sub-programs. It is mainly focused on MASS sea test bed, which will verify and validate all the developed technologies from KASS project.

For a commercial viable option of MASS, there could be two different types of challenges: the one is about how effectively to integrate all functions and verify them under some appropriate test-bed and infrastructures. The other could be about how to get an accreditation for commercial operations in safety and security points at least. The present presentation will show the validation plan for an Autonomous ship in commercial operation point of view.

Name: Laurent Courregelongue
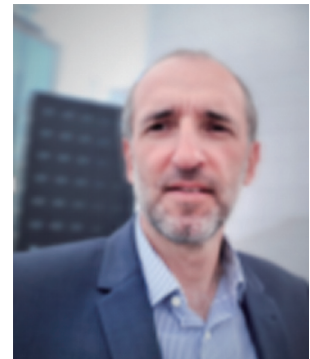**Position:** Director Department Environment & Technologies
Organization: Bureau Veritas Marine & Offshore
Email: Laurent.courregelongue@bureauveritas.com
Report Theme: Green Ships
Major Research Directions: Development of Classification Rules related to the energy transition and the introduction of alternative fuels and technologies in maritime.
Summary of Report: Presentation of the context and the status of BV's latest developments to provide the Marine Industry with Classification Rules addressing the introduction of alternative fuels (e.g. LNG, methanol, ammonia, hydrogen) and technologies (e.g. fuel cells, battery systems, wind) to meet the challenge of decarbonizing the marine transport.

Name: Laurent Verney
Position: Development Department Director
Organization: BUREAU VERITAS Marine & Offshore
Email: laurent.verney@bureauveritas.com
Report Theme: Smart shipping
Major Research Directions: Mr Laurent VERNEY is graduated from Ecole Centrale de Nantes (1995) and joined Bureau Veritas in 2001 as an offshore structure specialist. Since 2018 he is Director of the Development Department which is in charge of classification rules and technical software development.
For few years our research activities include also Smart and Autonomous Navigation Technology for Ships in order to propose classification rules for such augmented ships

Summary of Report: BV reports its Rules development for Smartship.
There are already the guidelines for autonomous ships (BV NI 641) and the rules on cyber security for the classification of marine units (BV NR 659).
Now based on experiences from research projects, new rules are developed for SMART functions defined as computer based system that incorporate functions for the collection, the transmission, and the analysis of data for the navigation and the operation of ships.

Name: Long LIU
Position: Professor
Organization: College of Power and Energy Engineering, Harbin Engineering University
Email: liulong@hrbeu.edu.cn
Report Theme: Fuels for Zero-Carbon ship and Ammonia Combustion in Marine Dual-Fuel Engines
Major Research Directions: Prof. Long Liu's research interest includes energy conversion, low/zero carbon fuels, marine engine, spray and combustion, combustion control and optical diagnostics technologies. He made the significant contributions on the combustion concepts and control strategies for marine engines. Recently, his research was focused on the zero carbon fuel combustion strategies in marine engine for future zero-carbon ships.

Summary of Report: Due to the increasingly serious global warming phenomena, the Green House Gas (GHG) emission has been paid unprecedented attention by shipping industry. International Maritime Organization (IMO) has enacted "Initial Strategy on reduction of GHG gas emissions from ships" in the year of 2018, it indicated that the GHG emission would be eliminated using zero-carbon fuel for ship. But there are many kinds of zero-carbon fuels that could be used for marine engines. What is the suitable zero-carbon fuel? Meanwhile, the combustion process of different fuels results in different challenges, such as knocking, low thermal efficiency, high ignited energy and so on. This work will summarize and analyze the utilization potentiality of zero-carbon alternative fuel for ships, and some of the new clean power technologies, which has important guiding significance for the development of zero-carbon fuel for ships in the future.
Ammonia is one of the potential zero-carbon fuel for marine engine. The properties of ammonia, such as large amount of evaporation energy, high ignition energy, slow flame propagation speed, would lead to different combustion process from present marine engines. Which is the better choice, gas or liquid ammonia? The combustion mode of present marine could be used for ammonia? The report will pursue the ammonia combustion in marine engine, and the advanced research results on the ammonia combustion processes in a marine dual-fuel engine will be shown and discussed.

Name: Nesvåg, Odd Magne
Position: Technical Responsible
Organization: DNV, Norway
Report Theme: Smart and Autonomous Vessel Development in Norway
Profile: Odd Magne graduated in 1995 as Master of Science in Electrical Engineering and has since then worked in several positions in DNV related to electrical and automation systems in ship and offshore installations, including approval, testing, trials and surveys. After 10 year as Head of Section for Control Systems in Classification, Odd Magne is now technical responsible for ship systems and components and involved in service and rule development for smart, autonomous and remotely operated vessels.

Name: Qidan ZHU
Profile: Qidan Zhu, Professor, PhD Supervisor and Director of the Institute of Intelligent Control, Harbin Engineering University, was appointed by Ministry of Education of China as the director of the Key Laboratory of Intelligent Technology and Application of Marine Equipment. Prof. Zhu has been engaged in scientific research in the fields of control theory and control engineering, pattern recognition and intelligent systems research. His main research areas are robotics and intelligent control, machine vision detection technology, advanced control theory and applications, and complex system analysis and decision making. Prof. Zhu has more than 100 publications, including 4 books, 1 translation, over 100 academic papers and over 10 invention patents. As the project leader, Prof. Zhu undertakes nearly 50 projects including the National Natural Science Fund Project, the Ministry of Industry and Information Technology High-tech Ship Project, the Ministry of Science and Technology International Cooperation Project, the National Defense Science and Engineering Commission Basic Research Project and other horizontal cooperation. Due to the significant impacts on society, Prof. Zhu was awarded National Science and Technological Progress Second Prize for one, the first prize of National Defense Science and Technology Progress Award for three times, the first prize of the Army Science and Technology Progress Award, Second Prize of Provincial and Ministerial Level Science and Technology Progress for three times, and Third Prize of Provincial and Ministerial Science and Technology Progress for six times. He was awarded as the distinguished young scientist of China Shipbuilding Industry Corporation. He is also the executive director of Heilongjiang Automation Society and the editor-in-chief of "Applied Science and Technology" magazine.

Name: Ryohei Sawada

Position: Researcher

Organization: National Institute of Maritime, Port and Aviation Technology, National Maritime Research Institute (NMRI)

Email: sawada-r@m.mpat.go.jp

Report Theme: Autonomous ship

Major Research Directions: My major research interests are in autonomous vessels and technologies to automate ship operations. In particular, I am working on the research and development of technologies for automatic collision avoidance and automatic berthing control. For collision avoidance, I am studying the acquisition of collision avoidance maneuvering for multiple target ships using deep reinforcement learning. For automatic berthing control, we are researching safe control technology and its implementation, taking into account disturbances such as wind, using our experimental ship.

Summary of Report: In this report, I introduce the research related to autonomous ships that we have conducted so far. First, I show an example of automatic collision avoidance based on models using deep reinforcement learning, which has attracted much attention in recent years. Next, I will introduce our research on automatic berthing control using our own experimental ship "Shinpo", including onboard equipment, algorithms, and monitoring techniques. Finally, we briefly summarize the sensors used for automatic ship operations.

Name: Sewon Kim

Position: Assistant Professor

Organization: Sejong University Unmanned Object Major

Email: sewonkim@sejong.ac.kr

Topic of Speech: Zero-Emission Fuel Application of Autonomous Vessel Routing in Northern Sea Route

Major Research Directions: Sejong University Unmanned Object Major, Autonomous Shipping laboratory, focuses on the realization of autonomous ship routing. Mainly we are researching routing optimization, collision avoidance, and the infrastructure of the autonomous vessel voyage. Simultaneously, our laboratory is working on the autonomous control of vessels, offshore platforms, submarines, and navy vessels.

Summary of Speech: Carbon Neutral is the most critical agenda for the global community and the shipping industry. The shipping company put efforts to apply next-generation zero-emission fuel to achieve the neutral carbon regulation. Liquid hydrogen is the ultimate goal for the long rage shipping to realize a carbon-neutral future. Naturally, the global hydrogen import and export will have surged, and it is expected to be over 130 million tons per year. Simultaneously, the trade of liquid hydrogen would be expanded. The Northern sea route is the promising energy trade such as LNG and Liquid hydrogen. Under considering the harsh environment of the north, the autonomous vessel is a strong candidate for northern sea liquid hydrogen transportation. To analyze its transportation performance, the modeling of the autonomous ship voyage optimization includes liquid hydrogen transportation and propulsion. This speech proposes a new method that models liquid hydrogen transportation and propulsion performance in long-distance autonomous vessel shipping based on the boil off gas modeling and the fuel gas system. The boil of gas modeling and the variation of the required power under arctic sea route environments are included in the research. The key contribution is that the boil-off gas amount estimation is suggested considering the variation of the exhaust temperature due to the voyage planning. The boil-off gas is the amount of the gas that vaporized due to pressure and thermal change during the voyage. The boil-off gas decreases the total amount of the liquid hydrogen cargo, so it shrinkages the total revenue. The operation cost of the Suez-canal route is compared to when the northern sea route for liquid hydrogen transportation.

Name: Shukui LIU
Position: Lecturer
Organization: Nanyang Technological University
Email: skliu@ntu.edu.sg
Report Theme: On the Safe Navigation of Energy-Efficient Ships in Adverse Conditions
Major Research Directions: Marine hydrodynamics, Ship performance in seaways, Ship design.
Summary of Report: After the introduction of Energy Efficiency Design Index (EEDI) for reducing the Green House Gas (GHG) emission from ship operations, IMO introduced an interim guideline in 2013 for determining minimum propulsion power to maintain the manoeuvrability of ships in adverse conditions, which was finalized at MEPC76. The presentation will begin from reviewing the development of the IMO guidelines for the assessment of the minimum propulsion power. It will then present a case study using a standard VLCC design to show the influence of the new guidelines on the ship powering requirement. The uncertainties involved in the assessment procedure will be discussed. Next, potential measures to optimize the overall ship design to comply with the requirement of the guideline are presented. Lastly, the speaker will also discuss the way ahead for the further development of the guideline.

Name: Tore Longva
Position: Principal Consultant
Organization: DNV, Norway
Report Theme: Maritime Forecast to 2050: An Energy Transition Outlook for Shipping
Profile: Tore Longva has a MSc in Industrial Economics from the Norwegian University of Science and Technology (2004). He has worked in DNV since 2006 on research and business development projects, and currently he is holding a position in the Regulatory Affairs department. His focus areas are innovation in maritime transport value chains; and improving environmental performance of shipping. Tore Longva has been a key part of several forecast studies on emission reduction and cost-benefit assessments of technologies. He has been following closely the development of regulating GHG in shipping as an advisor in the Norwegian delegation to the Marine Environmental Protection Committee in the IMO.

Name: Xiaofeng LUO
Major: Naval Architecture
Title & Position: Director of Wuhan Rules & Research Institute, China Classification Society
Report Theme: Keynote Speech: Safety Technology and Solutions to Application of Cell Power on Ships in China
Profile: Mr. Luo Xiaofeng, a professor senior engineer, has long been engaged in waterborne application and risk assessment study of new energy and study on the technical standards for ships. He has presided over the editing of more than 30 rules or regulations including *Rules for Construction of River-sea Navigation Ships of Designated Routes, Guidelines for Surveys of Unmanned Surface Vehicle, Guidelines for Surveys of Power Vessels, Rules for Inland Waterways Green Ships, Rule for construction of inland waterway ships, Rules for Natural Gas Fuelled Ships, Rules for Classification and Construction of Waterborne Liquified Natural Gas Fuelled Bunkering Pontoons, Rules for Construction and Equipment of Liquified Natural Gas Floating Srotage and Regasification Units, Rules for the construction of Ocean Fishing Vessel*, and etc. The Research of Three Gorges Reservoir area ships Navigation Safety and support technology in the charge of him awarded the first prize of China Institute of Navigation, and The Research and development of the Rules and Key technology for Liquified Natural Gas (LNG)Bunkering Pontoons awarded the second prize of China Institute of Navigation.

Name: Xinping YAN

Position: Academician, the Chinese Academy of Engineering; Professor, Wuhan University of Technology, China

Report Theme: Development of Research on Smart and Autonomous Ship Technology in China

Profile: Dr. Xinping Yan is Academician of the Chinese Academy of Engineering, Chair Professor and Director of National Engineering Research Center for Water Transport Safety (MoST), Base for International Science & Technology Cooperation on Smart Shipping and Maritime Safety (MoST), and Collaborative Innovation Platform for Intelligent Inland Waterway Transportation (MoT), Wuhan University of Technology, China. He is a Fellow and Chartered Marine Scientist of IMarEST. His research interests include intelligent transport system key technologies, intelligent fault diagnosis of marine engines, renewable energy, energy efficiency management of the vessel, navigation systems for vessels, etc. Dr. Yan has led the research team and been awarded the Second Prize of National Technological Invention Award (2012), the Second Prize of National Science and Technology Progress (2016), and National Award for Excellence in Innovation in 2020.

Name: Zunhua ZHANG

Position: Professor

Organization: School of Naval Architecture, Ocean and Energy Power Engineering

Email: zunhuazhang@whut.edu.cn

Report Theme: Progress and Challenges in High Efficiency and Clean Combustion of Marine Engines Fueled with Ammonia

Major Research Directions:

1.Laminar flame and chemical kinetics

2.alternative fuels and advanced combustion technologies

3.spray and turbulent combustion

4.marine low-carbon fuels and hybrid power

5.chemical reaction flow and heat mass transfer

6.catalyst production and hydrogen reforming

Summary of Report: Exploring alternative fuels is essential for marine engines to achieve carbon neutrality. Ammonia is a fuel with excellent storage and transportability. However, the application of pure ammonia as an engine fuel will face many problems, such as low flame speeds, high auto-ignition temperature, a narrow flammability range., etc. In addition, emissions of NOx can be comparatively significant. In this report, the fundamental spray and combustion characteristics of ammonia and ammonia blends are presented, and then progress and challenges in the marine engines fueled with ammonia are emphasized.

Name: Yi Yang
Position: Senior Research Fellow
Organization: Acoustics Research Centre Department of Mechanical Engineering
The University of Auckland
Email: yi.yang@auckland.ac.nz
Topic of Speech: Vibroacoustic modelling of novel structures
using wave and finite element methods
Major Research Areas: Research areas: vibroacoustic modelling, analysis and design of novel structures using wave and finite element methods, statistical energy analysis, hybrid methodologies, and wave-based metamaterials, uncertainty modelling; Applications includes building acoustics, ships, submarines, aircrafts, high-speed trains,etc.

Research outcomes: Yi has published 12 Journal papers (first author: 7) and 5 conference papers in high-quality journals: Journal of Sound and Vibration (5), Journal of Acoustical Society of America, Mechanical Systems and Signal Processing. The last five-year citation is 127 (Scholar)
with a h-index of 7 (Scholar).

Summary of Speech: Multi-story ships, high-speed trains, and aircraft are large complex systems built up from large-scale subsystems such as walls/floors, train body and fuselage. These subsystems are typically composed of complicated novel structures (e.g., cross-laminated-timber (CLT) panels, corrugated-core panels, honeycomb-core panels). The lightweight mass of the structures makes the systems susceptible to mechanical and aerodynamic excitations by transmitting significant vibration and radiating loud noise, which decreases their acoustic performance and even increases operational risks. Over the years, analytical methods and finite element have been used for modelling their vibroacoustic characteristics. However, using analytical methods is difficult and even impossible for modelling structures of complicated construction, while finite element involves a high computation cost for large-scale subsystems and middle-high frequency problems. Therefore, developing efficient and robust tools for predicting and improving structural vibroacoustic performances is a burning issue for designing quieter and safer systems. This speech concerns a wave and finite element method for investigating the vibroacoustic characteristics of complex structures to address the pressing problem.

Name: JL Mantari
Position: Professor
Organization: National University Of Engineering, Peru
Email: jmantaril@uni.edu.pe
Topic of Speech: Green design and construction in the naval engineering sector
Major Research Areas: Composite materials; Elastomers; Plastics; Design of machine systems; Biomechanics; Safety of fishing vessels; Applied mathematics and physics; Analytical modelling; Computational mechanics
Summary of Speech: Doctor in Naval Architecture and Marine Engineering from the Technical University of Lisbon (World Top2). Author of more than 80 scientific articles published in acclaimed journals. Reviewer of more than 30 indexed journals. Distinguished Researcher in Peru, 10 projects in progress. Winner of the 2013 Peruvian Pride Award; Elsevier 2017; among others awards.

Name: Roee Diamant
Position: Associate Professor
Organization: University of Haifa
Email: roee.d@univ.haifa.ac.il
Title of Speech: Acoustic Detection of Slowly Moving Targets in High Clutter
Major Research Areas: Underwater acoustic signal processing with applications in acoustic localization, passive and active detection of objects, sonar image processing, underwater acoustic communication and networking, marine observatories.
Summary of Speech: We consider the challenge of tracking and estimating the size of a single submerged target in a high reverberant underwater environment using a single active acoustic transceiver. This problem is common for a multitude of applications, ranging from the security and safety needs of tracking submerged vehicles and scuba divers, to environmental research and management implications such as the monitoring of pelagic fauna. As opposed to common approaches that track targets through template matching or by using tracking filters, we avoid making difficult assumptions about the target's reflection patterns or motion type, and instead perform probabilistic tracking using a constraint Viterbi algorithm, whereby detection is determined based on maximum likelihood criterion. In this process, we use the expectation-maximization (EM) approach to manage stationary reflections through distribution analysis, which otherwise may be misidentified as targets. Based on the tracked path, we then evaluate the target's size. Extensive simulations as well as eight sea experiments to track both scuba divers and a sandbar shark show a tracking performance that is close to the Cramer-Rao lower bound and a good trade-off between detection rate and false alarm rate for a low signal-to-clutter ratio of 5 [dB], and average tracking error of 1.5m.

Name: Majed Shreka
Position: PhD student
Organization: Harbin Engineering University
Email: majed.shreka@outlook.com
Topic of Speech: Methane slip reduction from LNG-fuelled ships in order to achieve low-carbon emissions
Major Research Areas: Exhaust emissions control technologies for marine engines.
Summary of Speech: The use of low-pressure lean-burn gas engines has become more and more prominent within the shipping community. Lately, with legislators' attention firmly focused on greenhouse gas, the problem of methane slip has come into the spotlight and raised questions on the climate benefits of LNG as an engine fuel for marine applications. Methane slip emissions need to be resolved otherwise the environmental benefits of using LNG as a fuel will be reduced. Using a non-thermal plasma catalyst hybrid system is a promising technology and can effectively increase the conversion efficiency of methane at low exhaust gas temperature as compared to the other after-treatment technologies.
Methane slip problem and the possible solutions to control it with more focus on non-thermal plasma technology will be more addressed and discussed.

Name: Cheng Zhu

Position: PhD Student

Organization: Department of Science and Technology on Underwater Vehicle Laboratory, Harbin Engineering University,

Email: oliver_rlz@hrbeu.edu.cn

Topic of Speech: Distributed affine formation maneuver control of marine surface vehicles

Major Research Areas: Autonomous marine surface vehicles; Formation control; Sliding mode control

Summary of Speech: The speech focuses on the distributed formation maneuvering of marine surface vehicles (MSVs). Compared with the normal formation control, the formation maneuver control enables the system to avoid obstacles by configuration transformations, instead of extra collision avoidance calculation.

Name: Jie Zhao

Position: PhD Student

Organization: The College of Intelligent Systems Science and Engineering, Harbin Engineering University

Email: Jiezhao@hrbeu.cn

Topic of Speech: Quasi-LPV-based composite anti-disturbance dynamic positioning control of vessels

Major Research Areas: my current research interests include unmanned surface vehicles formation control and vessel dynamic positioning control.

Summary of Speech: A composite anti-disturbance surface ship dynamic positioning control strategy based on the Quasi-LPV model is proposed, in which the linear matrix inequality conditions for state dependence are established under modeling uncertainty and complex ocean environment disturbances, the positions and velocities in the nonlinear model of the vessels are considered as the state dependence of the Quasi-LPV model. The composite control strategy of the inner and outer layer structure consists of a feedback compensator and H2/H∞ control. With the action of the disturbance observer, the inner layer mechanism achieves the suppression of slowly changing disturbances in the ocean, and the outer layer attenuates the disturbances caused by residual filtering and other model-constrained uncertainty disturbances, and the effectiveness and superiority of the control scheme are verified by simulation and comparison.

**Name:** Yanan Liu

Position: PhD student

Organization: College of Underwater Acoustic Engineering, Harbin Engineering University

Email: liu_yanan@hrbeu.edu.cn

Topic of Speech: Subcarrier modulation identification of underwater acoustic OFDM

Major Research Areas: Underwater Acoustic Communication and Detection; Underwater Acoustic Release Development

Summary of Speech: The low identification rate of the Orthogonal frequency division multiplexing (OFDM) based subcarrier modulation in underwater acoustic multipath channel is an important issue. In this report, we discuss a novel Expectation Maximization-Block-Quasi Hybrid Likelihood Ratio Test (EM-Block-QHLRT) method which effectively improved the identification rate while using the blind channel impulse response (CIR) estimation and likelihood. Initially, CIR is obtained by using clustering, and then the CIR is updated iteratively by EM-Block method. Further, the subcarrier modulation is identified using QHLRT. The report will be consists of five parts, research background and introduction, algorithm analysis, numerical simulation, experimental results and conclusion.
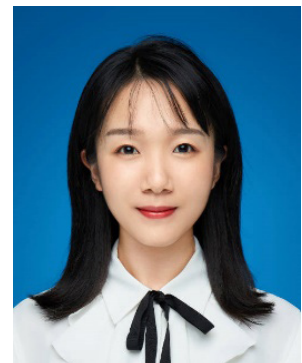
Attendees

Australia	Wenhua ZHANG	University of Western Australia
Brazil	Antonio Carlos Fernandes	Federal University of Rio de Janeiro
China	Dacheng GUO	China Association of the National Shipbuilding Industry
	Xiaofeng LUO	China Classification Society
	Miao XU	China State Shipbuilding Corporation Limited
	Haifeng LIU	Tianjin University
Finland	Bolbot Victor	Aalto University
	Janne Lahtinen	Satakunta University of Applied Sciences
France	Sime Malenica	Bureau Veritas
	Xiaobo CHEN	Bureau Veritas
	Laurent Verney	Bureau Veritas
	Laurent Courregelongue	Bureau Veritas
	Guojian CHEN	Bureau Veritas
	Pierre Ferrant	Ecole Centrale Nantes
Japan	Tingyao Zhu	Class NK
	Ryohei Sawada	National Institute of Maritime, Port and Aviation Technology
	Etsuro Shimizu	Tokyo University of Marine Science and Technology
Korea	Sewon Kim	Sejong University
	Jin Kim	Korea Research Institute of Ships and Ocean Engineering (KRISO)
	Yonghwan Kim	Seoul National University

Country	Name	Affiliation
Norway	Øyvind Pettersen	DNV
	Nesvåg, Odd Magne	DNV
	Kristine Bruun Ludvigsen	DNV
	Tore Longva	DNV
	Hans Petter Hildre	Norwegian University of Science and Technology
	Houxiang Zhang	Norwegian University of Science and Technology
Portugal	Carlos Guedes Soares	University of Lisbon
Russia	Dmitry Studenikin	Admiral Ushakov Maritime State University
Singapore	Daniel Zhang	Nanyang Technological University
	Shukui LIU	Nanyang Technological University
	Tan Cheng Peng	Singapore Maritime Institute
	Shukui LIU	Singapore Polytechnic
	Yisi Liu	Singapore Polytechnic
Thailand	Cherdvong Saengsupavanish	Kasetsart University
	Ratthakrit Reabroy	Kasetsart University
	Suphasin Changprasert	Kasetsart University
UK	Heike Deggim	International Maritime Organization
	Qingwei Ma	London Metropolitan University
Ukraine	Eugeniy Trushliakov	Admiral Makarov National University of Shipbuilding
USA	Solomon Yim	Oregon State University

Participating Organizations

Russia	Federal State University of Higher Education Siberian State University of Water Transport
	Institute of Oceanology named after P.P. Shirshov of the Russian Academy of Sciences
	Maritime State University named after Nevelskoy
	MIREA - Russian Technological University
	Moscow Institute of Physics and Technology MIPT "Phystech"
	Moscow State Technical University N.E.Bauman
	National Research Technological University "MISiS"
	Peter the Great St. Petersburg Polytechnic University
	Saint Petersburg State Marine Technical University
	Sevastopol State University
	St. Petersburg National Research University of Information Technologies, Mechanics and Optics.
	St. Petersburg State Electrotechnical University "LETI".
	State Maritime University named after Ushakova
	State University of Maritime and River Fleet named after Admiral S.O. Makarov
	Volga State University of Water Transport

China	Aida Investment Group Company Ltd.
	AVIC Xi'an Flight Automatic Control Research Institute
	Beibu Gulf University
	Beijing Highlander Digital Technology Co., Ltd.
	Beijing Institute of Technology
	China Association of the National Shipbuilding Industry
	China Institute Of Marine Technology And Economy
	China Nonferrous Metal Mining (Group) Co., Ltd
	China Ship Development and Design Center
	China Ship Scientific Research Center
	China Ship Scientific Research Center
	China Three Gorges University
	Chongqing Jiaotong University
	CIMC Raffles Offshore Ltd.
	CNOOC Research Institute
	CSSC Systems Engineering Research Institute
	Dalian Maritime University

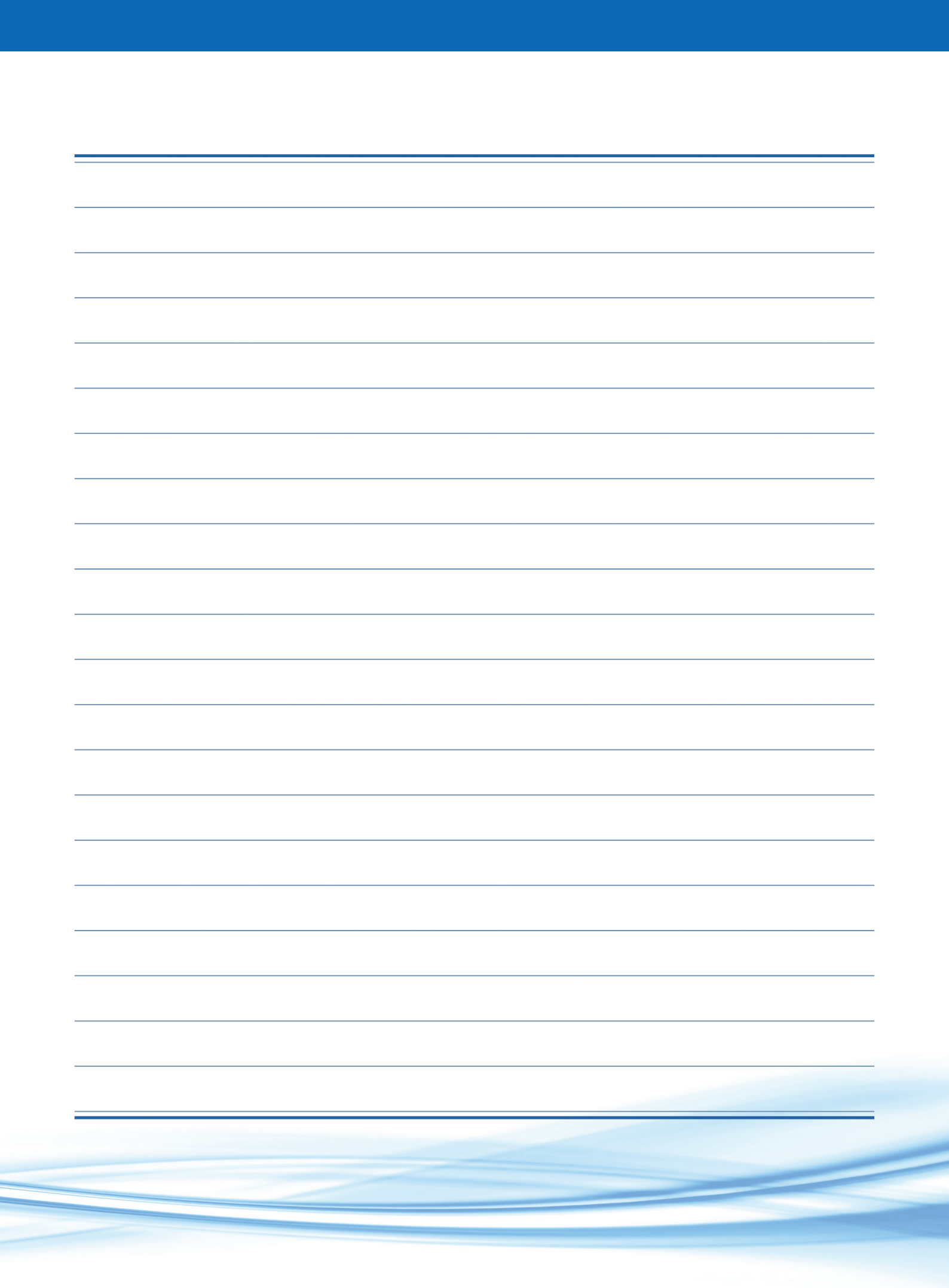| China	
	Dalian Shipbuilding Industry Co., Ltd
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	GuangDong Ocean University
	Harbin Electric Corporation
	Harbin Institute of Technology, Weihai
	Hohai University
	Huazhong University of Science and Technology
	Institute of Engineering Thermophysics,Chinese Academy of Sciences
	Jiangsu University of Science and Technology
	JiMei University
	Marine Design&Research Institute of China
	Nanjing University of Aeronautics and Astronautics
	Nanjing University of Science & Technology
	Ningbo University
	Northwestern Polytechnical University
	Ocean University of China
	Qingdao Beihai Shipyard
	Qingdao maritime bureau of the P.R.C
	Shandong Maritime Safety Administration
	Shanghai Jiao Tong University
	Shanghai Maritime University
	Shanghai Merchant Ship Design&Research Institute
	Shanghai Ship and Shipping Research Institute
	Shanghai Waigaoqiao Shipbuilding Co., Ltd.
	Shanxi Datong University
	Sinopec Group
	South China University of Technology
	Suzhou Inovance Technology Co., Ltd
	Tianjin University Of Technology
	Wuhan changjiang ship design institute co.,ltd.
	Wuxi Industrial Equipment Installation CO.,Ltd
	Xiamen Maritime Safety Administration of the P.R.C
	Yangzhou ZTL New Material CO.,Ltd
	Zhejiang University

Contacts

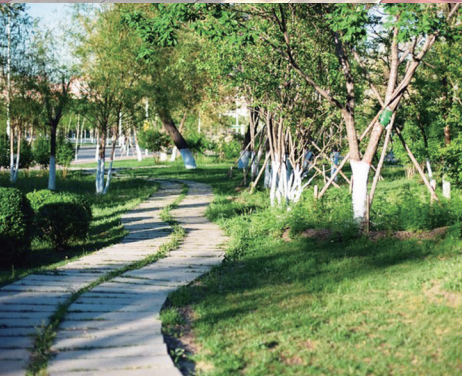| The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021) |
| --- |
| **Opening Ceremony** |
| 16th November, 6:00-6:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040 |
| **Preliminary Meeting for the Establishment of the International Smart and Autonomous Navigation Ships Joint Lab** |
| 16th November, 7:00-8:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040 |

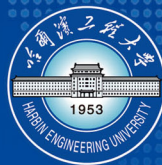| The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021)
The 1st International High-level Forum on Smart and Autonomous Navigation Technology of Ships |
| --- |
| 16th November, 9:00-12:40 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040 |
| 17th November, 6:00-9:50 (GMT+0, London Time)
Virtual Meeting (ZOOM): 835 6652 8040 https://zoom.us/j/83566528040 |

The 5th International Conference of Naval Architecture and Marine Engineering (ICNAME 2021) High-level Forum on Green Ship Technology
16th November, 7:00-9:10 (GMT+0, London Time) Virtual Meeting (ZOOM): 893 8090 0700 https://zoom.us/j/89380900700
17th November, 6:00-8:50 (GMT+0, London Time) Virtual Meeting (ZOOM): 893 8090 0700 https://zoom.us/j/89380900700

Innovation& Cooperation in Naval Architecture&Marine Engineering Alliance (ICNAME 2021) Youth Forum on the Innovation in Naval Architecture and Marine Engineering
17th November, 9:00-12:30 (GMT+8, Beijing Time) ZOOM meeting: 829 1755 7720; Link: https://zoom.us/j/82917557720

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