ROMANIAN NAVAL ACADEMY
"MIRCEA CEL BATRAN"

SEA - CONF 2026
12th INTERNATIONAL CONFERENCE

May 14th – 16th, 2026
Constanta

SEA-CONF 2026
PROGRAMME

Thursday, 14th of May 2026
Arrival of participants

Friday, 15th of May 2026
08.00 – 09.00 Participants registration; distribution of folders with promotional content
09.00– 10.00 Official opening Sea-Conf 2026 at ”Vice-Admiral Ion Coandă” Auditorium:

- Raising the Flag Ceremony;
- Welcome message of the Rector of Romanian Naval Academy “Mircea cel Batran”.
- Plenary sessions:
  - **“Highway Lighting System Simulations using the Dialux Evo Software to Increase the Energy Efficiency”-** Leon Pană, Eduard Dragomir, Vasile Dobref, Vlad Mocanu;
  - **“Enhanced Performance in Transmission Electron Microscopy through Electron Precession Systems”-** Radu Manu, Dumitru Corduneanu, Paul Burlacu, Alexandru Pintilie, Jenel Vătămanu, Florin Postolache, Elena Stoica, Răzvan Mateescu, Corneliu Porosnicu, Victor Ciupina;
  - **“OCTOPUS – Computerized Instrument for the Dynamic Behavior Analysis of the Ship on the Sea. Case Study for the "Mircea" Training Ship” -** Alexandru Pintilie, Mihaela-Greti Manea, Paul Burlacu, Elisabeta Buzilă;

10.00 – 10.15 Group Photo; Coffee Break
10.15 – 11.00 Visiting the RNAMB university campus
11.00 – 14.30 Paper Presentation on Sections:
Section A - Mechanical Engineering, **Room Ep 26**

Section B - Electrical Engineering, Automation and Computer Science, **Room LI 356**

Section C - Navigation, Transport and Management, **Room LP 11**

Section D - Fundamental and Applied Research, Military, Linguistics and Social Sciences, **Room L 120, L121**

Section E - Workshop: „***CyberSEA - Increasing Cyber Security at SEA through Digital Training,*** Erasmus+ Program - KA220-VET - Cooperation Partnerships in Vocational Education and Training 2023-1-ES01-KA220-VET-000159793; "CyberSEA project - Enhancing Cybersecurity in the Maritime Domain" - **Room L120**

Starting with 14.30 – Closing remarks and conclusions – Aula Magna Lobby.

Saturday, 16th of May 2026

10.00 – 12.00 Visit of Constanta city(individually);

12.00 – Departure of participants.

SCIENTIFIC COMMITTEE

CHAIRMAN: Alecu TOMA, Rector of Romanian Naval Academy "Mircea cel Batran"

MEMBERS (in alphabetical order):

- Avni Zafer ACAR (Turkey)
- Nicoleta ACOMI (Romania)
- R S AJIN (India)
- Taner ALBAYRAK (Turkey)
- Beazit ALI (Romania)
- Dinu - Vasile ATODIRESEI (Romania)
- Rita Elena AVRAM (Romania)
- Laura BACALI (Romania)
- Dana BADAU (Romania)
- Ghita BARSAN (Romania)
- Andrei BAUTU (Romania)
- Blagovest BELEV (Bulgaria)
- Hristo BELOEV (Bulgaria)
- Melat BORMAMBET (Romania)
- Romeo BOSNEAGU (Romania)
- Luminita BUGA (Romania)
- Paul BURLACU (Romania)
- Daniela CAPRIOARA (Romania)
- Maria Filomena CAPUCHO (Portugal)
- Ionel CHIRICA (Romania)
- Catrina CHIVU (Romania)
- Laura Diana CIZER (Romania)
- Catalin CLINCI (Romania)
- Valentina COATU (Romania)
- Carmen COJOCARU (Romania)
- Carolina CONSTANTIN (Romania)
- Alexandru COTORCEA (Romania)
- Irina CRISTEA (Slovenia)
- Ovidiu CRISTEA (Romania)
- Dumitru DELEANU (Romania)
- Florentiu DELIU (Romania)
- Vasile DOBREF (Romania)
- Leonard DOMNISORU (Romania)
- Florentina Loredana DRAGOMIR (Romania)
- Mihail DUMITRU (Romania)
- Virgil ENE-VOICULESCU (Romania)
- Oral ERDOGAN (Turkey)
- Jean-Claude FRERY (France)
- Mihai GIRTU (Romania)
- Gheorghe GRECU (Romania)
- Rosen IVANOV (Bulgaria)
- Ricardo IZZO (Italy)
- Nicolae JULA (Romania)
- Kalin KALINOV (Bulgaria)
- Mihail KOCHUBOVSKI (Macedonia)
- Dorin LUCACHE (Romania)
- Sergiu LUPU (Romania)
- Carmen MAFTEI (Romania)
- Mihaela-Greti MANEA (Romania)

- Daniel MARASESCU (Romania)
- Liviu MARSAVINA (Romania)
- Razvan MATEESCU (Romania)
- Eugen MAVRIS (Romania)
- Boyan MEDNIKAROV (Bulgaria)
- Lucia MELNIC (Romania)
- Maria Emanuela MIHAILOV (Romania)
- Ticuta NEGREANU-PIRJOL (Romania)
- Florin NICOLAE (Romania)
- Filip NISTOR (Romania)
- Catalin Silviu NUTU (Romania)
- Suleyman OZKAYNAK (Turkey)
- Dimitrios Nikolaos PAGONIS (Greece)
- Valeriu Nicolae PANAITESCU (Romania)
- Cristian Adrian PAPARI (Romania)
- Radu-Dumitru PENTIUC (Romania)
- Valentina Mihaela POMAZAN (Romania)
- Adrian POPA (Romania)
- Catalin POPA (Romania)
- Mihaela POPA (Romania)
- Anca Alexandra PURCAREA (Romania)
- Ileana RAU (Romania)
- Gheorghe SAMOILESCU (Romania)
- Sergiu SERBAN (Romania)
- Marius SERBESZKI (Romania)
- Liviu STAN (Romania)
- Tomasz SZUBRYCHT (Poland)
- Deniz UNSALAN (Turkey)
- Ion VISA (Romania)
- Constantin Iulian VIZITIU (Romania)
- Octavian VOLINTIRU (Romania)
- Remus ZAGAN (Romania)
- Tania ZAHARIA (Romania)

Organizing Committee

Chairman

Captain Assoc. Prof. **Paul BURLACU**, PhD

Members

Captain Assoc. Prof. **Filip NISTOR**, PhD

Col. Assoc. Prof. **Cătălin POPA**, PhD

Captain Assoc. Prof. **Sergiu LUPU**, PhD

Captain Assoc. Prof. **Adrian POPA**, PhD

Commander Assoc. Prof. **Alexandru COTORCEA**, PhD

Captain **Cătălin Paul CLINCI**, PhD

Assoc. Prof. **Andrei BĂUTU**, PhD

LCDR Assoc. Prof. **Cristian SCURTU**, PhD

Commander Lecturer **Narcis VOLINTIRU**, PhD

Lieutenant Lecturer **Andra NEDELCU**, PhD

LCDR Lecturer **Sergiu ȘERBAN**, PhD

Captain Assoc. Prof. **Florenţiu DELIU**, PhD

LCDR Assoc. Prof. **Ovidiu CRISTEA**, PhD

Commander Assoc. Prof. **Daniel MĂRĂȘESCU**, PhD

Captain (r) Prof. **Vasile DOBREF**, PhD

Commander **Dragoș SIMION**, PhD

Organizing Committee by Sections

Electrical Engineering, Automation and Computer Science Section
Room LI 356
Chairman: Vasile DOBREF
Members: Iancu CIOCIOI, Tiberiu PAZARA

Fundamental and Applied Research, Military, Linguistics and Social Sciences Section
Rooms L120, L121
Chairman: Andrei BĂUTU, Laura CIZER
Members: Elena Rita AVRAM, Adriana SPORIȘ, Anda OLTEANU, Carmen COJOCARU, Edith KAITER, Corina SANDIUC

Mechanical Engineering Section
Room Ep 26
Chairman: Daniel MĂRĂȘESCU
Members: Mihaela Greti MANEA, Narcis VOLINTIRU, Doru COȘOFREȚ

Navigation, Transport and Management Section
Room LP 11
Chairman: Sergiu LUPU
Members: Romeo BOȘNEAGU, Sergiu ȘERBAN, Gheorghe GRECU

CONTENTS

I. ELECTRICAL ENGINEERING, AUTOMATION AND COMPUTER SCIENCE SECTION

with variable operating modes and reliability constraints—requires the implementation of advanced mechanisms for monitoring, analysis, and predictive control. The following are analyzed: the architecture of naval power systems, the associated IT infrastructure, and the mechanisms for collecting and processing operational data. Integrated energy monitoring and management platforms ensure grid stability, optimize electricity distribution, and increase operational efficiency. The application of machine learning algorithms enables energy consumption modeling.

Keywords: power management, electricity, artificial intelligence, machine learning, monitoring systems, control equipment, predictive maintenance

3. Computerized Study of the Naval Electric Power Flow – ID28

Mariana Dumitrescu[1]
[1]"Dunărea de Jos" University, Galați, Romania

Abstract: Modelling and design of the naval electric power system (NEPS) represents a complete and great importance task, giving information for the generation, transmission and distribution system. NEPS is very complex as configuration, but also as technical electrical analysis. This engineering scientific approach needs professional software tools dedicated. - Energy Distribution System Analysis (EDSA) software is one of the valuable professional tools capable to give the complete analysis for all power systems technical aspects, like safety, power flow continuity, stability, efficiency, maintenance, quality. The paper focuses on a real study case of an oil tanker NEPS. The results of the analysis, show that most consumers are active and reactive power consumers and some consumers introduce reactive power into the system and are therefore reactive power sources. Active and reactive detailed power flow results show equipment power loading, power losses values, total electric power balance. It reflects the designing state and NEPS functional conditions accuracy.

Keywords: Marine Industry, Computer Design, Naval Power System, Power Flow Efficiency

4. Power Load Analysis for a Naval Plant Study Case – ID29

Mariana Dumitrescu[1]
[1]"Dunărea de Jos" University, Galați, Romania

Abstract: Sea vessels represent particularly complex technical systems. Among the installations on board, a special place is occupied by the ship's electrical power installation. Power flow computing and electric power balance analysis for the electric power system (EPS) represents an initial design task for the specialists. The paper focuses on a real study case of a cargo ship power flow analysis. The study concerns a container ship with the main propulsion engine 47430 KW active power, and it can transport up to 8600 Twenty-foot Equivalent Unit (TEU). Results of the

detailed power flow analysis show equipment power loading, power losses values, total electric power balance. It conducts, starting from the design state to the specific EPS naval rules and regulations achievements check, for all the operational modes, like march, manoeuvring, stationary without loading-unloading operations, stationary with loading-unloading operations.
Keywords: Marine Industry, Naval Power System, Electric Design, Power Flow Efficiency

5. Electromagnetic Compatibility Testing of Military Ships – ID38

Iancu Ciocioi[1], Florențiu Deliu[1], Ciprian Popa[1], Gheorghe Samoilescu[1]
[1]Romanian Naval Academy

Abstract: Electromagnetic compatibility (EMC) testing of military ships is an essential process for ensuring the correct and safe operation of electrical and electronic systems under complex operational conditions. This paper presents a methodology for assessing electromagnetic compatibility at the ship level, considering the vessel as an integrated system. The objectives include determining overall electromagnetic susceptibility, optimizing operations by reducing interference, and verifying the self-compatibility of installed equipment.
The testing process is structured into two main stages: (i) assessing the impact of unintentional emissions on radio-frequency (RF) sensors and analyzing their susceptibility to portable emission sources, and (ii) determining the overall electromagnetic compatibility of onboard systems under real operational conditions. The paper also details the conditions for conducting these stages, as well as the test scenarios based on perturbator–susceptor combinations.
Keywords: electromagnetic compatibility, electromagnetic interference, EMCON

6. Sentinel 2 Tools for Monitoring and Detecting the Eutrophication Status of Freshwater Lakes, the Case of Lake Siutghiol – ID43

Gabriel Prodan[1], Eden Mamut[1], Marius Skolka[1], Sibel Osman[1], Laurențiu Oancea[1]
[1]Ovidius University, Constanța Romania

Abstract: Inland lakes, and especially those in areas with anthropogenic activity, are prone to the tendency to move towards a eutrophic state due to nutrient. This manifestation, which affects the inland lakes, has lately become a global ecological problem. The associated ecosystems will suffer effects, including the deterioration of biodiversity, closely related to the decrease in oxygen in the water and algal blooms. Traditional methods are limited, difficult, time-consuming, and in some cases impossible, so an alternative that is taking shape is remote sensing (using data from satellites such as Sentinel-2 and Landsat), which allows rapid and extensive monitoring of lakes or areas of interest. The assessment of the eutrophication state by analyzing several categories of parameters: bio-physical parameters, climatic

and hydrodynamic parameters, and advanced spectral can make up for the lack of data obtained by local measurements. Each country takes into account certain aspects and establishes a series of parameters that characterize the state of the ecosystems. In the case of lakes, for example, the concentration of chlorophyll a, total nitrogen, total phosphorus, and turbidity can be considered as bio-physical parameters (alternatively, you can opt for the depth determined using the Secchi disk). Nitrogen and phosphorus from various sources are considered the nutrients that dictate the ecosystem's response, but a direct method of detection using satellite data is not possible. Factors that depend on the climate of the location, the hydrographic basin that develops, and the ecosystem can be considered to understand the phenomena that lead to the evolution in that area. For the satellite data, a number of indices have been identified that depend on the spectral bands or the ratios between these bands, such as NDVI for vegetated areas, NDWI for wetlands or bodies of water. If the water quality or eutrophication status is to be determined, it is necessary to determine the concentrations of chlorophyll A, total nitrogen, total phosphorus and the turbidity of the water. The work establishes a series of methods and identifies the appropriate tools for monitoring and detecting the eutrophic state of shallow lakes, such as the Siutghiol lagoon.

Keywords: Sentinel 2, algal bloom, chlorophyl-a, turbidity, machine learning

7. Highway Lighting System Simulations using the Dialux Evo Software to Increase the Energy Efficiency – ID50

Leon Pană[1], Eduard Dragomir[1], Vasile Dobref[1], Vlad Mocanu[1]
[1]Romanian Naval Academy

Abstract: The design of the highway lighting system involves two essential stages, namely: the lighting system itself and the electrical power supply installation including the protection system. The LED technology that has evolved in recent years offers significant advantages in terms of energy efficiency and obviously for the intelligent control of the lighting system. Special attention is paid to the protection system because LED lighting fixtures contain electronic components that are extremely sensitive to surges, mainly atmospheric ones but also switching ones. These surges will affect the power drivers and LED components, having a negative effect on them by reducing their lifetime. Another aspect is related to the inrush current because in the first half-period the current is variable, after which they stabilize at normal operating conditions. Thus, transient phenomena occur during the switching process. In this sense, to have complete protection, an integrated system composed of miniature circuit breaker, surge protection device and voltage threshold tripping device will be used.

Keywords: LED, highway, system lighting, electrical installation, energy efficiency, over voltages

8. Analysis of Earth Faults in Marine Alternators using the Symmetrical Components Method – ID51

Eduard Dragomir[1], Leon Pana[1], Vasile Dobref[1], Vlad Mocanu[1]
[1]Romanian Naval Academy

Abstract: During the operation of marine alternators, faults may occur that may be internal or external. One of the most common is earth fault that may occur at the alternator terminals or earth faults in the stator and rotor.
The single-phase fault is asymmetrical, therefore classical calculation methods cannot be used. For this purpose, the symmetrical components method is used to analyze this type of fault. In the case of a simple earth fault, the system becomes unbalanced in both voltages and currents, so based on the symmetrical components method, it is decomposed into three systems, namely one of positive sequence, the second of negative sequence and the last of zero sequence.
Depending on the way the neutral is treated, several examples will be analyzed, namely a high-voltage alternator with an isolated neutral, a high-voltage alternator with the neutral connected to ground through a high-value resistance operating independently. The case when they operate in parallel is also analyzed.

Keywords: Earth fault, alternators, symmetrical components, sequence impedances

9. The Simulation of the Electromagnetic Disturbances against One Electronic Circuit and their Effects – ID52

Vasile Dobref[1], Vlad Mocanu[1], Leon Pană[1], Eduard Dragomir[1]
[1]Romanian Naval Academy

Abstract: This paper presents a SPICE-based simulation study of electromagnetic disturbances acting on ground circuits in naval electronic equipment. The analyzed system is an analog-digital oscillator powered at 5 V, composed of a TTL analog section with two npn transistors and a digital JK logic section, separated by an inverter with an anti-disturbing role. First, the useful signal is examined under normal operating conditions by waveform observation, logic-state evolution, and Fourier analysis up to the ninth harmonic. From these results, a disturbance factor of kdu = 0.42 is obtained. Next, fictitious voltage sources are inserted on different ground nodes to simulate electromagnetic interference. For a sinusoidal disturbance of 100 kHz and 1 V applied to ground node 2, the disturbance factor rises to kdu1 = 0.57, showing significant signal degradation. Additional simulations at 10 MHz, 10 kHz, and DC confirm the harmful influence of disturbances and the need for electromagnetic protection.

Keywords: Electromagnetic compatibility, SPICE simulation, electromagnetic disturbances, Fourier analysis, analog-digital oscillator

10. Modeling and Optimization of Battery-Based Energy Storage Systems for UAVs – ID81

Adrian Nicolae Pascu[1], Nicolae Silviu Popa[1], Ovidiu Cristea[1], Florențiu Deliu[1], Ionuț Șerban[1]
[1]Romanian Naval Academy

Abstract: This paper investigates the optimization of energy storage systems for research unmanned aerial vehicles (UAVs), with the primary objective of improving flight endurance and operational safety. In modern UAV missions, characterized by extended operational durations and highly variable load conditions, the overall performance of the platform is strongly influenced by the efficiency of the onboard energy system. To address these challenges, the study proposes an integrated framework based on electro-thermal modeling combined with advanced energy management strategies. A numerical model implemented in the MATLAB environment is developed, where the lithium-ion battery is represented through an equivalent electrical circuit model, while the thermal behavior is described using a lumped-parameter thermal model capable of estimating temperature evolution during operation. In order to mitigate transient loads and high current peaks, a hybrid energy storage architecture consisting of a battery pack and a capacitor is investigated, enabling an efficient power-sharing mechanism between the components of the energy system. The simulation results demonstrate that the proposed hybrid architecture reduces ohmic losses, improves terminal voltage stability, and enhances the overall energy efficiency of the system. Additionally, a battery mass optimization procedure is conducted to determine the optimal configuration that maximizes flight endurance. The results highlight the inherent trade-off between the installed energy capacity and the impact of additional mass on the aerodynamic performance of the UAV. Overall, the proposed modeling and optimization framework provides a useful tool for the design and evaluation of efficient energy storage systems in UAV applications.

Keywords: UAV flight endurance optimization, MATLAB-based simulation, research unmanned aerial vehicles, energy storage systems, lithium-ion batteries

11. A Review of Wave Energy Projects – ID85

Bianca Ioana Mîndroiu[1], Georgiana Dunca[1], Ionuț Cristian Scurtu[2]
[1]National University of Science and Technology Politehnica Bucharest
[2]Romanian Naval Academy

Abstract: This paper investigates the historical and scientific evolution of wave energy conversion systems. The objectives of the study include identifying global research trends and the technologies utilized in the progressive development of wave energy harvesting systems. Globally, is an increasing demand for renewable energy, and the concept of transforming wave power into a sustainable energy source has transitioned from theoretical frameworks to real and functional

solutions. The study employs a bibliometric analysis using specialized software to map connections and commonalities across more than 1,600 scientific articles indexed in academic databases. The results highlight a technological transition from simple mechanical systems to the complex contemporary devices such as point absorbers and oscillating water columns. Furthermore, the analysis demonstrates that the success of wave energy harvesting systems depends on the interaction between hydrodynamics, structural design, and control strategies. The research concludes that adapting current technologies to region-specific conditions through energy efficiency improvement techniques leads to the long-term viability of wave energy projects.
Keywords: wave energy conversion, bibliometric analysis, renewable energy, point absorber, oscillating water column

II. FUNDAMENTAL AND APPLIED RESEARCH, MILITARY, LINGUISTICS AND SOCIAL SCIENCES SECTION

II.a MATHEMATICS AND NATURAL SCIENCES

1. Continued Fractions: A Deep Look at Simple Numbers – ID1

Petrică Cîrciumaru

Abstract: Continued fractions provide a powerful and elegant representation of real numbers through nested rational expressions. Unlike decimal expansions, continued fractions often reveal deep arithmetic properties of numbers and yield optimal rational approximations. These abstract reviews the fundamental theory of simple continued fractions, including their construction via the Euclidean algorithm and their convergence properties. Special attention is given to periodic continued fractions and their connection with quadratic irrational numbers, as well as to the role of convergent in Diophantine approximation.

Keywords: continued fractions

2. Mathematics Education in Higher Military Institutions in the Balkan Region: Comparative Analysis and Institutional Challenges – ID6

Pavlin Tsonev[1]

[1]"Georgi Benkovski" Air Force Academy, Dolna Mitropolia

Abstract: This paper presents a comparative analysis of mathematics education in higher military institutions in the Balkan region. The study is based on survey data collected from six military universities in Bulgaria, Greece, Romania and Croatia. The analysis focuses on several indicators describing the organisation of mathematics education, including the number of teaching hours per semester, the number of semesters in which mathematics is studied and the weight of mathematics in admission procedures. A comparative examination of the mathematical subjects included in the curricula is also conducted. The results demonstrate that although the analysed universities share a common theoretical mathematical core, substantial differences exist in the intensity and organisation of mathematical training. Particular attention is given to institutional challenges related to mathematics education at the Bulgarian Air Force Academy. The findings are discussed within the broader context of engineering and military education in Europe.

Keywords: mathematics education; military academies; engineering education; comparative analysis; Balkans

3. Hausdorff Dimension of Exceptional Sets in θ-Expansions: Refining Classical Results – ID13

Gabriela Ileana Sebe[1], Dan Lascu[2]
[1]National University of Science and Technology Politehnica Bucharest & Gheorghe Mihoc-Caius Iacob Institute of Mathematical Statistics and Applied Mathematics of the Romanian Academy
[2]Romanian Naval Academy

Abstract: We investigate the fractal complexity of two families of exceptional sets arising in θ-expansions, a natural generalization of regular continued fractions. First, we establish new bounds for the Hausdorff dimension of the set of numbers with bounded partial quotients. Our estimates improve upon Jarník's classical bounds even in the special case of regular continued fractions. Second, we prove that for every $\beta \geq 0$, the set of numbers for which the normalized largest partial quotient converges to β has full Hausdorff dimension. The proofs combine dynamical properties of the θ-expansion with refined covering and mass distribution techniques.

Keywords: θ-fractions, Hausdorff dimension, bounded partial quotients, exceptional sets

4. Khinchine and Diamond–Vaaler Type Theorems for \Theta Expansions– ID14

Andreas Rusu[1], Gabriela Ileana Sebe[1]
[1]National University of Science and Technology Politehnica Bucharest

Abstract: We investigate limit theorems for digit sums associated with \theta-expansions, a class of continued fraction algorithms. Starting from classical results from the metric theory of regular continued fractions, we analyze the asymptotic behavior of the sum of digits in this more general setting. We establish a Khinchine-type weak law of large numbers via the sum of digits, showing that the normalized sum converges in probability to an explicit constant. We also prove a Diamond-Vaaler-type strong law for the sum with the largest digit removed, highlighting the influence of extreme terms. This result extends a classical theorem of Philipp to the \theta-expansion setting. The proofs rely on the explicit invariant measure and mixing properties of the underlying dynamical system.

Keywords: \theta-expansion, limit theorems, weak and strong law of large numbers

5. Nonlinear Transmission Eigenvalue Problems with Nonhomogeneous Operators of Different p-Growth – ID15

[1]Raluca Turtoi
[1]Ovidius University, Constanța, Romania

Abstract: Let $D\subset\mathbb{R}^N$, $N\ge2$, be a bounded domain with Lipschitz boundary, divided by a Lipschitz hypersurface Σ into two open, disjoint Lipschitz subdomains D_1 and D_2. We consider a nonlinear transmission eigenvalue problem, driven by p_i-Laplacian like operators. The formulation involves continuity of the solution and flux transmission conditions across the interface Σ, while the parameter λ appears both in the equations and in the nonlinear boundary conditions. Using variational methods, we prove that every positive number is an eigenvalue, thus the set of eigenvalues coincides with $(0,\infty)$. As a particular case, the results apply to the associated single-domain problem.

Keywords: transmission problems, bulk–boundary eigenvalues, p–Laplacian–like operator, Krasnosel'skii genus, Lusternik–Schnirelmann theory, Mountain pass theorem

6. Automatic Polybios Encryption and Decryption – ID16

Paul Vasiliu[1], Florentiu Deliu[1], Tiberiu Pazara[1]
[1]Romanian Naval Academy

Abstract: In this paper, Matlab implementation of the Polybios encryption system is presented. An example of encoding/decoding solved manually and automatically using the proposed Matlab implementation is presented.

Keywords: encoded, decoded, encryption, system

7. An OpenLayers-Based Web GIS Platform for Spatial Security Management of Critical Maritime Infrastructure – ID21

Marius Iulian Mihăilescu[1], Ștefania Loredana Niță[2], Laurențiu Bogdan Asalomia[3], Valentina Marascu[1], Gheorghe Samoilescu[4]
[1]"Spiru Haret University" Constanța, Romania
[2]"Ferdinand I" Military Technical Academy
[3]Northern Marine Management Limited
[4]Romanian Naval Academy

Abstract: This paper presents a web-based GIS platform for the spatial security management of critical maritime infrastructure, using OpenLayers for interactive geospatial visualization and analysis. The proposed system integrates heterogeneous data layers such as ports, access channels, vessel traffic, surveillance assets, and security zones in order to support maritime situational awareness and decision-making. The platform includes core functionalities such as real-time layer filtering, spatial querying, geofencing, and risk-oriented

visualization of sensitive areas. A case study focused on the Romanian coastal zone demonstrates the applicability of the solution for monitoring and protecting critical maritime assets. The results highlight the potential of Web GIS technologies to provide an interoperable and scalable framework for maritime security applications.

Keywords: Web GIS, OpenLayers, Maritime Security, Critical Infrastructure, Spatial Analysis, Situational Awareness

8. Geospatial Visualization of Maritime Cyber-Physical Threats Using OpenLayers – ID22

Marius Iulian Mihăilescu[1], Valentina Marascu[1], Ștefania Loredana Nița[2], Laurențiu Bogdan Asalomia[3], Gheorghe Samoilescu[4]
[1]"Spiru Haret University" Constanța, Romania
[2]"Ferdinand I" Military Technical Academy
[3]Northern Marine Management Limited
[4]Romanian Naval Academy

Abstract: This paper presents a web-based GIS platform for the geospatial visualization and analysis of maritime cyber-physical threats, using OpenLayers as the main interactive mapping framework. The proposed system is designed to support maritime situational awareness by integrating spatial data related to vessel movement, critical maritime infrastructure, and cyber-relevant anomalies such as AIS spoofing, GPS inconsistencies, and abnormal vessel behavior. The platform enables the visualization of threat locations, affected zones, incident timelines, and spatial risk patterns through an interoperable Web GIS architecture. By combining geospatial data representation with security-oriented event mapping, the proposed solution provides an intuitive operational picture for monitoring and assessing cyber-physical risks in maritime environments. A conceptual case study focused on the Romanian maritime area demonstrates the applicability of the platform for supporting maritime security analysis and decision-making.

Keywords: Web GIS, OpenLayers, Maritime Cybersecurity, Cyber-Physical Threats, Maritime Situational Awareness, Geospatial Analysis

9. On the Closed Neighborhood Ideals of Graphs – ID26

Anda Olteanu[1]
[1]Romanian Naval Academy

Abstract: We consider closed neighborhood ideals for the squares of paths and study their properties. We express invariants such as Castelnuovo-Mumford regularity, height, and projective dimension in terms of combinatorial properties of the given graph.

Keywords: monomial ideals, graphs, projective dimension, Castelnuovo-Mumford regularity

10. The Role of Leadership in Military Sciences – ID32

Andreea Maria Preda[1], Alin Marian Constantin[1]
[1]"Alexandru Ioan Cuza" Police Academy, Romania

Abstract: The paper examines the relationship between military sciences and leadership, emphasizing their complementary role in ensuring the effectiveness, adaptability, and professionalism of modern armed forces. Military sciences provide the theoretical and practical framework for understanding warfare, defense strategy, operational planning, logistics, and the evolving nature of security threats. At the same time, leadership represents the human dimension that transforms doctrine, knowledge, and resources into coordinated and efficient action. The study highlights the importance of strategic thinking, ethical responsibility, decision-making under pressure, and the ability to adapt to technological and geopolitical change. Particular attention is given to the role of leadership in shaping organizational culture, maintaining discipline, strengthening cohesion, and preparing military personnel for complex operational environments. The paper also addresses contemporary challenges such as hybrid warfare, cyber threats, and multinational cooperation, which require both advanced military knowledge and strong leadership capacities. The analysis demonstrates that military sciences and leadership are inseparable components of military professionalism and remain essential to operational success, institutional stability, and national security.

Keywords: military sciences, leadership; strategy, command, operational art, military ethics, decision-making, professional military education, hybrid warfare, national security.

11. About Some Results on Linear Operators in Locally Convex Cones – ID35

Ligia-Adriana Sporiș[1], Beazit Ali[1]
[1]Romanian Naval Academy

Abstract: The main goal of this note is to discuss about some properties of linear operators on locally convex cones.

Keywords: locally convex cone, linear operator

12. A Comparative Technical Analysis of Anti-Drone System Technologies: Kinetic, Laser and High-Power Microwave Approaches – ID36

Octavian-Gabriel Chiriac[1], Adrian-Nicolae Rotariu[1], Florin-Marian Dirloman[1], Florina Bucur[1]
[1]"Ferdinand I" Military Technical Academy

Abstract: This paper examines three main technologies for countering drones: kinetic projectiles, high-energy lasers, and high-power microwave systems. The analysis considers operational performance, operational environment endurance, and cost-effectiveness. Kinetic solutions offer precise engagement with low

collateral risk, but remain limited to neutralizing a single target. Laser systems allow for rapid interception at a very low cost per hit, although their effectiveness is strongly affected by weather conditions. High-power microwave technologies offer a unique advantage against drone swarms by simultaneously disabling multiple targets at minimal operational cost. The study concludes that integrated, multi-layered defense architectures offer superior effectiveness by compensating for individual system limitations, addressing individual system threats, addressing emerging autonomous threats, and reducing reliance on costly missile-based air defense solutions.

Keywords: drones, laser, microwaves, projectiles

13. Agentic AI Orchestration Using Graph-Based Modeling and GNN Enhanced Decision Support Applied for Students' Mental Well-being – ID40

Adela Bara[1], Simona-Vasilica Oprea[1]
[1]Bucharest University of Economic Studies, Romania

Abstract: The increasing prevalence of mental health challenges among university students requires scalable, reliable, and clinically governed digital support systems. This paper introduces an intelligent self-help AI assistant designed for university mental well-being, which integrates deterministic psychometric evaluation with advanced agentic AI orchestration and graph-based intelligence. The AI assistant adopts a controlled multi-agent paradigm, where a central profiler agent governs the structured user state and orchestrates interactions between specialized agents. These include (i) cognitive agents, responsible for contextual reasoning, psychometric interpretation, and trajectory analysis, and (ii) recommender agents, which generate personalized psychoeducational guidance and behavioral suggestions constrained by a curated knowledge base. A key contribution of this work lies in the integration of graph-based modeling, where user states, psychometric indicators, contextual stressors, and intervention pathways are represented as nodes within a dynamic knowledge graph. Relationships between these entities capture temporal evolution, causal dependencies, and behavioral patterns. On top of this structure, Graph Neural Networks (GNNs) are employed to learn latent representations of user trajectories, enabling improved risk stratification, pattern detection, and early identification of critical mental health states. The proposed framework contributes to the emerging field of agentic AI systems in healthcare, demonstrating how orchestrated agents, combined with graph intelligence, can deliver scalable, interpretable, and ethically compliant decision support systems for mental well-being.

Keywords: Agentic AI, Large Language Models (LLMs), Graph-based modelling, Graph Neural Networks (GNNs), students' well-being

14. Analyzing Climate Change Misinformation through Bibliometric Methods and Generative AI: Insights from the AI-Research-Lens Platform – ID41

Simona-Vasilica Oprea[1], Adela Bara[1]
[1]Bucharest University of Economic Studies, Romania

Abstract: This study investigates the phenomenon of misinformation in the context of climate change by integrating bibliometric analysis with generative artificial intelligence techniques. The research leverages the AI-Research-Lens: AI-Powered Bibliometric Analytics Framework to systematically explore the scientific landscape, identifying key trends, influential publications, and thematic clusters related to climate misinformation. Through bibliometric methods, the study maps the evolution of research topics, collaboration networks and knowledge structures within this domain. Complementarily, generative AI models are employed to synthesize insights, detect emerging narratives and evaluate the propagation patterns of misleading information. By combining quantitative bibliometric evidence with advanced AI-driven content analysis, the paper provides a comprehensive understanding of how climate-related misinformation develops and spreads in scientific and public discourse. The findings contribute to the development of more robust analytical frameworks for detecting, interpreting and mitigating misinformation, supporting policymakers, researchers and stakeholders in promoting accurate and evidence-based climate communication.

Keywords: AI-Research-Lens, generative AI, climate change, misinformation, fake news

15. Modern Military Leadership in Conditions of Dynamic Security Threats – ID46

Seweryn Bołdak[1]
[1]Veteran

Abstract: The contemporary security environment is increasingly shaped by rapidly evolving and multidimensional threats, requiring military leaders to operate under conditions of uncertainty, complexity, and time pressure. This paper aims to examine the critical competencies and leadership approaches necessary for effective command in such a dynamic context. Particular emphasis is placed on adaptive decision-making, strategic thinking, and the ability to integrate technological advancements into operational frameworks. The study explores how modern conflicts, including hybrid and asymmetric warfare, influence leadership paradigms and demand greater flexibility and resilience from military personnel. Furthermore, the paper discusses the role of communication, organizational culture, and team cohesion in enhancing operational effectiveness. Drawing on selected models and best practices from contemporary armed forces, the analysis highlights the importance of continuous professional development and

interdisciplinary skill integration. The findings suggest that modern military leadership must transcend traditional command structures, incorporating both technical expertise and soft skills to effectively respond to emerging security challenges and ensure mission success.

Keywords: military leadership, crisis management, national security, decision-making, command and control, military strategy, organizational resilience, team management, strategic communication

16. Private Ethereum Blockchain for Digital Identity Verification – Cryptographic Foundations and Experimental Implementation – ID59

Mihail Daniel Ghita[1], Ciprian Racuciu[1]
[1]"Ferdinand I" Military Technical Academy

Abstract: This paper provides an integrated treatment of the cryptographic foundations of blockchain technology, and the experimental implementation of a digital identity verification prototype based on a private Ethereum blockchain network with IBFT2 consensus mechanism.

The work systematically covers: the mathematical formalization of distributed ledgers and the digital trust problem; the historical evolution from early cryptographic chains to the modern blockchain ecosystem; the technological architecture of blockchain systems including block structure and P2P protocols; consensus mechanisms — PoW, PoS, and BFT — with formal security analysis; essential cryptographic primitives (SHA-256/Keccak hash functions, ECDSA, Schnorr signatures, Merkle structures); structural innovations introduced by blockchain; technological limitations and deployment models; and, as the original contribution, the design and experimental implementation of a private Ethereum network with 4 IBFT2 validators, 3 Solidity smart contracts for identity management (EthereumDIDRegistry, VCStatusRegistry, AccessControlRegistry), and performance metric evaluation.

The paper concludes with a synthesis of findings and argumentation for future research directions centered on Zero-Knowledge Proof integration for a hybrid on-chain/off-chain Verifiable Credentials architecture.

Keywords: private blockchain, Ethereum, IBFT2, Hyperledger Besu, digital identity verification, DID, Verifiable Credentials, ECDSA, Schnorr, hash functions, smart contracts, Zero-Knowledge Proofs

17. AI-Orchestrated Cyber-Espionage: A Quantitative Framework for Kill-Chain Compression, Autonomy Thresholds and Systemic Risk – ID65

Florin Postolache[1], Teodor-Petruț Ilie[1]
[1]Romanian Naval Academy

Abstract: The rapid integration of artificial intelligence (AI) into cyber operations is transforming cyber-espionage from sequential, human-driven activities into

automated and increasingly autonomous systems. This study examines how AI reshapes the speed, scale, and systemic impact of cyber-espionage across the cyber kill chain through a quantitative, secondary-data-based synthesis of threat intelligence reports, academic research, and documented campaigns.
To capture this transformation, the paper develops a six-dimensional analytical framework encompassing historical evolution, offensive capabilities, social engineering, persistence and stealth, geopolitics and attribution, and systemic risk. The empirical analysis reveals a consistent pattern of temporal compression, whereby attack lifecycles are reduced from weeks or months to hours or minutes, accompanied by substantial increases in attack volume and operational scalability. Evidence from recent campaigns indicates autonomy levels reaching 80–90%, signaling a transition from tool-based automation to AI-orchestrated, agentic workflows.
The findings demonstrate that AI acts as a structural driver of cyber-espionage, generating non-linear effects across the operational lifecycle and amplifying systemic vulnerabilities. In particular, the industrialization of social engineering and the increasing opacity of AI-mediated operations introduce significant challenges for attribution, governance, and strategic stability.
The study contributes a quantitatively grounded and integrative framework that conceptualizes AI-driven cyber-espionage as a persistent systemic condition rather than a set of discrete incidents. It further introduces the concept of autonomy thresholds as a critical inflection point in cyber operations and provides a structured basis for analyzing the emerging risk landscape. These results offer actionable insights for cybersecurity strategy and support the development of adaptive governance models in AI-enabled threat environments.
Keywords: artificial intelligence, cyber-espionage, cyber kill chain, autonomy thresholds, systemic risk, social engineering, nation-state actors

18. From Linear Models to Probabilistic Defense: Reinterpreting the Cyber Kill Chain Using Empirical Cyber Threat Data – ID67

Florin Postolache[1], Otniel-Daniel Indrei[1]
[1]Romanian Naval Academy

Abstract: The Cyber Kill Chain (CKC) remains one of the most influential conceptual frameworks in cybersecurity, yet its linear structure has become increasingly inadequate in the context of modern, adaptive cyber threats. This paper proposes a comprehensive reinterpretation of the CKC model by integrating recent empirical data (2024–2025) and extending its applicability across multiple domains, including financial systems, maritime navigation and space infrastructure. Using a probabilistic, phase-based analytical approach, the study models cyberattack progression as a funnel rather than a sequential chain, quantifying the likelihood of adversary success at each stage. The findings reveal

that while reconnaissance and weaponization are nearly universal phases, only a small fraction of attacks successfully reach the final objective stage. The research further maps defensive controls to each CKC phase and evaluates their effectiveness using recent industry statistics. Additionally, the paper incorporates cross-domain case studies (the Bangladesh Bank heist, Stuxnet, maritime GNSS spoofing and satellite cyber incidents, etc.) to demonstrate the evolving nature of cyber operations beyond traditional IT environments. The study contributes to the literature by proposing a hybrid analytical framework that combines the Cyber Kill Chain with statistical modeling and modern security architectures, offering actionable insights for both academic research and operational cybersecurity practice.

Keywords: Cyber Kill Chain, cybersecurity modeling, probabilistic attack analysis, ransomware, maritime cybersecurity, satellite security, MITRE ATT&CK, defense-in-depth

19. Machine Learning Methodologies for Predictive Analysis of Stock Market Trends – ID68

Alexandru-Ionel Toma[1]

[1]National University of Science and Technology Politehnica Bucharest

Abstract: Electronic trading has evolved from 19th-century mechanical systems into a complex digital ecosystem that often defies traditional statistical analysis. To address the limitations of classical frameworks in portraying modern market complexities, financial researchers have increasingly turned to high-tech solutions, specifically neural networks and machine learning. This article provides a comprehensive review and assessment of state-of-the-art machine learning methodologies currently employed for predictive analysis in stock markets. This study evaluates the effectiveness, accuracy, and practical usability of these techniques. Specifically, the analysis focuses on the capacity of machine learning to predict price fluctuations, identify emerging market trends, and provide robust decision support for investment planning in an increasingly volatile financial landscape.

Keywords: Machine Learning, Stock Market, Neural Networks, Financial Forecasting, Algorithmic Trading, Predictive Analytics

20. Training Maritime Personnel in Cybersecurity: Modern Approaches within the CyberSea Project – ID75

Andrei Băutu[1], Natalia Wawrzyniak[2], German de Melo Rodriguez[3], Aris Chronopoulos[4], Lakhvir Singh[5], Konstantinos Karampidis[6], Manos Vasilakis[6], Monika Klein[7], Tomaz Gregorič[8], Wili Helenius[9]

[1]Romanian Naval Academy

[2]Maritime University of Szczecin

[3]Universitat Politècnica de Catalunya
[4]IDEC SA
[5]Centre for Factories of the Future
[6]Hellenic Mediterranean University
[7]Berlin School of Business and Innovation
[8]Spinaker d.o.o.
[9]Satakunta University of Applied Sciences
Abstract: The accelerated digital transformation of the maritime domain and the convergence of IT/OT systems have led to a significant increase in cyber risks that can affect navigation safety and port operations. In this context, the adequate training of maritime personnel, starting with cadets and continuing with officers in service, becomes an essential component of cyber resilience. In this context, the specific challenges of the maritime environment are added, such as operational constraints, the heterogeneous level of personnel training and the need to align with international standards (e.g. IMO, ISPS). The paper presents a series of modern approaches to cybersecurity training, developed within the CyberSea project. An important element is the online training platform, which integrates structured educational content with interactive exercises, allowing users to acquire and apply knowledge in scenarios relevant to the maritime environment. The platform allows for the personalization of the learning path and the assessment of progress, contributing to increasing the efficiency of the educational process. Preliminary results indicate that the use of real-world scenario-based training methods, supported by interactive digital platforms, contributes to increasing awareness and improving the ability to react to cyber threats. The paper highlights the importance of an integrated and adaptive approach to cybersecurity training, capable of meeting the current and future demands of the maritime industry.
Keywords: cybersecurity, cybersea, IoT, maritime safery

21. An Extensible Architecture for Integrating Local and External Large Language Models into Moodle LMS – ID76

Elena Băutu[1], Andrei Băutu[2], Anca-Nicoleta Atodiresei[2]
[1]"Ovidius" University, Constanta, Romania
[2]Romanian Naval Academy
Abstract: The integration of artificial intelligence into e-learning platforms represents a major direction of evolution of digital educational environments, offering significant opportunities for personalizing learning and automating didactic processes. However, the use of AI models raises challenges related to flexibility, data control and dependence on external services.
This paper presents a modular and extensible architecture, based on open-source components, integrated in a containerized infrastructure. The solution allows for the efficient running of language models locally, ensuring increased control over

data and reduced dependence on external providers, as well as interoperability with commercial AI services, such as APIs offered by OpenAI and Google. The use of containers offers increased portability, scalability, security, and ease of implementation, both in academic environments and in restricted or isolated infrastructures. The architecture was validated by integrating with a Learning Management System, facilitating the use of AI functionalities in concrete educational scenarios, such as didactic content generation, virtual assistants for students, automated assessment and support for interactive activities. The paper analyzes the advantages and limitations of this hybrid approach (local + cloud), highlighting aspects related to performance, security, costs and user experience. Preliminary results demonstrate that such a technological stack offers an effective balance between autonomy, flexibility and access to advanced Large Language Models (LLMs), contributing to the development of modern and adaptable educational ecosystems.

Keywords: AI, LLM, cloud, e-learning

22. Elliptic Variational Inequalities IVE by Spectral Methods – ID79

Eleonora Răpeanu[1]

[1]Romanian Naval Academy

Abstract: The paper contains some results on Legendre polynomials, which are basic tools for spectral methods. The Galerkin approximation of the equations establishes the connection between IVE by spectral methods. Projection operators corresponding to spectral methods are introduced and approximation errors, the collocation method and the construction of computer programs for spectral methods, numerical methods are analyzed.

Keywords: IVE, MEF, collocation, approximation dimensions

23. Management of the Team of Athletes in Competition – ID80

Cristinel Olaru[1], Virgil Ene-Voiculescu[1], Horia Croitoru[1], Carmen Ene-Voiculescu[2]

[1]Romanian Naval Academy

[2]Ovidius University, Constanța, Romania

Abstract: Management does not contain mandatory, standardized recipes or templates, but involves analysis, discernment, and the application of skillful procedures, following a rigorous analysis, in relation to the existing reality. Competition is primarily a motivation to increase performance, a motivation fueled by the possibility of competitors winning. At the same time, for adequate management of the team of athletes in competitions, it is essential to optimize the relationship between the coach and the athlete, transparency being absolutely necessary. The coach must have clear behavioral expectations from the athlete and make them aware of them. The coach, in his role as manager, supports the athletes'

motivation and strengthens relationships within the team of athletes to unite them around a common goal: performance. By optimizing the leadership style, the coach, as a manager of the sports team, must aim to maximize sports performance, this objective having a direct relationship proportional to the degree of satisfaction of the athletes during the training period and after achieving the desired results. The positive effects of competition, within the sports competition, will be achieved only through psychological training aimed at training athletes in the ability to realistically set aspirations and optimally manage success and failure. The negative effects of competition appear in a situation where the athlete sees it only as a way to demonstrate supremacy or contempt for the defeated opponent.

Keywords: management; coaching, sports training; periodization; military sports

24. Machine Learning Techniques for Spam Message Detection – ID86

Georgiana Ștefănescu[1], Andrei Calin Sandu[2], Eugen-Cătălin Bucur[1], Ciprian Răcuciu[2]

[1]Romanian Naval Academy

[2]"Ferdinand I" Military Technical Academy

Abstract: Automatic spam detection remains a critical challenge in the context of the rapidly increasing volume of digital communication. This paper presents a machine learning-based system for classifying emails into legitimate and unsolicited categories, with a strong focus on designing a modular and scalable architecture. The proposed approach integrates multiple supervised classification algorithms, including Support Vector Machines, Logistic Regression, and tree-based models, enabling a comparative analysis of their performance within a unified pipeline. The training and evaluation process employs cross-validation and standard metrics such as accuracy, precision, recall, and F1-score to ensure robust model selection. A distinctive feature of the system is the implementation of an interactive interface that supports both real-time single-email classification and batch processing of MBOX archives. This functionality enhances the practical usability of the solution and makes it accessible to non-technical users.

Experimental results demonstrate the effectiveness of machine learning techniques in spam detection, while also highlighting the advantages of a flexible and extensible system architecture. The work contributes by providing an integrated framework for evaluating and deploying classification models in real-world content filtering applications.

Keywords: machine learning, spam detection, email classification, natural language processing, supervised learning

25. Geometric Representations in Scene Text Detection: A Structural Perspective – ID96

Sorin Milutinovici[1], Ciprian Racuciu[1]
[1]"Titu Maiorescu" University, Romania

Abstract: Automatic detection of text regions in natural images, sometimes called scene text detection, is a difficult problem in computer vision due to the high variability of text in the appearance, orientation, and geometric structure. Existing approaches are typically categorized based on architectural design or historical development, while the role of geometric representation is treated implicitly. In this paper, we formulate scene text detection as a structured prediction problem, in which the output consists of geometric objects embedded in the image plane. We propose a unified taxonomy of geometric representations, covering parametric models such as bounding boxes and quadrilaterals, as well as dense representations based on masks, affinity maps, and geometric fields. As methods evolve to address increasingly complex text instances, including rotated, deformed, and partially occluded text, representations shift from compact, explicit parameterizations toward flexible, implicit encodings that require reconstruction from dense predictions. This perspective highlights the trade-offs between representational expressiveness, computational cost, and post-processing complexity. In structured scenarios such as news broadcast text extraction, simpler geometric models provide an effective balance between accuracy and efficiency, while more complex representations are primarily justified in the presence of highly irregular text layouts.

Keywords: Detection Pipelines, Scene Text Detection, Geometric Modelling

26. Dataset-Driven Evolution and Complexity Distribution in Scene Text Detection Methods – ID97

Sorin Milutinovici[1], Ciprian Racuciu[1]
[1]"Titu Maiorescu" University, Romania

Abstract: This paper investigates the relationship between architectural design and dataset evolution in the field of scene text detection. While progress is often viewed as a linear sequence of architectural improvements, we argue that methods are primarily shaped by the geometric complexity of the benchmarks they target. We propose a two-stage conceptual framework that understands detection as a composite of a prediction stage (the model) and a reconstruction stage (post-processing). To quantify this, we introduce the Structural Complexity Quotient (SCQ), a metric that evaluates methods based on prediction density, feature aggregation, representational degrees of freedom, and post-processing burden. Our analysis reveals that increasing dataset complexity—from horizontal to multi-oriented and curved text—does not merely necessitate more powerful models, but

instead drives a redistribution of structural complexity between the predictive model and the reconstruction pipeline.
Keywords: scene text detection, geometric representation, dataset complexity

27. NATO's Eastern Flank and Trust in State Institutions: A Comparative Study of Romania and Poland after 2020 – ID102

[1]Alin-Valentin Mocanu
[1]"Mihai Viteazul" National Intelligence Academy

Abstract: The geopolitical landscape of recent years has underscored the vulnerabilities and challenges of the post-communist states within Eastern Europe, currently serving as NATO's Eastern Flank. Within this framework, public trust in state institutions emerges as a pivotal variable determining the stability of the social contract and the state-society nexus during periods of systemic crisis. This research provides a comparative analysis of institutional trust in Romania and Poland, covering the transformative period initiated in 2020. The methodology integrates a qualitative analysis of statistical data corroborated with official policy reports and extant academic literature. The study examines a significant sociopolitical paradox: while the military consistently maintains a preeminent position in sociological trust indices, there is an observable surge in institutional contestation within the public sphere. This phenomenon poses a potential risk to resilience, threatening to fragment the society in a volatile security environment. The findings suggest that institutional trust serves as a primary indicator of systemic stability and strategic endurance for ensuring the cohesion of NATO's Eastern Flank in the current security paradigm.
Keywords: Society, Institutions, Security, Romania, Poland, NATO

II.b SOCIAL SCIENCES AND HUMANITIES

1. Phrasal Verbs in EFL Writing: An Exploratory Study of Verb Choice in an Intensive Language Course – ID18

Maria Ciocan[1]
[1]Romanian Naval Academy

Abstract: Phrasal verbs constitute an important component of English vocabulary and play a central role in everyday communication. Despite their frequency in authentic language use, learners of English as a foreign language often hesitate to employ verb-particle constructions in productive language tasks. The present study examines the use of phrasal verbs in the written production of adult learners participating in an intensive English language course. The participants were ten intermediate-level learners enrolled in a twelve-week training program that combined general English instruction with military-related language activities. Data were collected through two classroom-based tasks: a report-writing activity and a lexical reformulation task. The written texts produced by the participants

were analyzed using descriptive lexical analysis in order to examine the distribution of phrasal verbs and single-word lexical verbs. The results indicate that although learners demonstrated familiarity with several phrasal verb constructions, their written production was dominated by single-word verbs. Phrasal verbs appeared relatively infrequently in the reports and were introduced in only a limited number of reformulation opportunities. These findings suggest that learners may rely primarily on single-word verbs even when phrasal verb alternatives are available and understood. They also point to the importance of instructional practices that encourage learners to engage actively with phrasal verbs and develop greater confidence in using verb-particle constructions in both spoken and written communication.

Keywords: phrasal verbs; verb-particle constructions; learner language; lexical choice; English for Specific Purposes; vocabulary acquisition

2. Offences Against Order and Discipline on Board Ships – ID20

Mihaela Rotaru[1]
[1]"Alexandru Ioan Cuza" Police Academy, Romania

Abstract: In the current international context, maritime transport in our country must be viewed within the global framework of which it is a part, as a vital link ensuring the smooth flow of international trade. Regulating an activity also involves defining the acts that constitute offenses, with criminal liability serving as a last resort. Although national legislation in this area has not undergone recent changes, and judicial practice does not abound in case law, we consider that an analysis of the legal content of offenses against order and discipline on board ships is necessary, from the perspective of the need to maintain maritime safety. We must also take into account the relevant international legal framework, particularly the legislative package on maritime safety adopted by the Council of the European Union in 2024. The analysis will focus on determining whether any legislative changes are necessary.

Keywords: offences, order, discipline, ships

3. Rethinking Teacher Education: The Importance of Integrating the TPACK Framework in Teaching Maritime English – ID23

Corina Sandiuc[1]
[1]Romanian Naval Academy

Abstract: The rapid transition to online and blended education in recent years has highlighted the necessity for language instructors to move beyond basic computer literacy and embrace a specialized framework for digital pedagogy. The Technological Pedagogical Content Knowledge (TPACK) framework has become a central model for understanding effective teaching in digital and blended learning environments. The present paper explores the ways in which TPACK can be

applied to Maritime English instruction, based on descriptive accounts and theoretical analyses from recent literature. The findings suggest that TPACK serves as the integrated foundation for successful digital instruction. It involves a sophisticated understanding of how to represent specific concepts using digital tools and implementing technological strategies that actively and constructively enhance the teaching of specific content. In highly specialized contexts such as maritime education, this expertise enables Maritime English teachers not only to align domain-specific content with communicative practices, but also to identify students' strengths and challenges and to use technology to build on prior knowledge and support new learning.

Keywords: TPACK framework, digital tools, online teaching/learning, professional development

4. Designing Online Learning with Moodle – ID25

Raluca Apostol-Mateș[1], Camelia Alibec[1]
[1]Romanian Naval Academy

Abstract: This article examines the principles and practices involved in developing effective online learning experiences using Moodle as a learning management system, with a focus on the MarLang project. It examines different educational approaches, course organization, and the use of interactive tools to boost student engagement and learning outcomes. The focus is on developing collaborative environments, integrating assessment methodologies, and matching instructional design to learner needs.

The study addresses issues including accessibility, usability, and teacher preparedness in Moodle-based online learning contexts while highlighting creative ways to multilingual and inclusive education, drawing on insights from MarLang.

Keywords: Moodle platform, online resources, maritime English, MarLang

5. Plea Agreement – Circumstance for Penalty Mitigation in Criminal Procedural Law – ID33

Elena-Irina Rahimian[1]
[1]"Alexandru Ioan Cuza" Police Academy, Romania

Abstract: Considered a very useful legal institution, the plea agreement is a special procedure regulated by articles 478-488 of the Code of Criminal Procedure, with a multitude of benefits, both for the person who committed a crime and for the justice system. Reduction of the sentence is the main advantage that the plea agreement offers the defendant. In the event that a defendant admits the act, he benefits from a less severe sentence compared to the sentence that would have been applied to him by the court following a full trial. Also, the efficiency of the judicial system will increase if criminal trials will no longer be lengthy, and the plea agreement will very often be accepted by the defendants. In addition to the advantages of the

plea agreement, there are also a number of disadvantages, such as: the defendant's waiver of the right to a full defense and the damage to the defendant's public image.
Keywords: circumstance for Penalty Mitigation, plea agreement, termination conditions

6. From Liberal Peace to Strategic Hedging: Security Reordering in the Western Balkans, 2024–2026 – ID44

Hekuran Budani[1], Jurgert Zavalani[1]
[1]Albanian Armed Forces Academy

Abstract: Since the early 2000s, the Western Balkans' security architecture has been largely shaped by the dual anchors of European Union conditionality and North Atlantic Treaty Organization security guarantees, reflecting the core assumptions of the liberal peace paradigm. However, developments between 2024 and 2026 suggest a partial reordering of this framework. States across the region have increased defence spending, diversified arms procurement, revitalized defence-industrial capacities, undertaken moves toward reintroducing conscription, and engaged in new forms of minilateral cooperation, while maintaining commitments to EU integration. Drawing on Regional Security Complex Theory (RSCT) and the concept of strategic hedging, this article examines whether these developments signal a transition toward a more autonomous and realist security configuration. Through a comparative analysis of Albania, Serbia, Croatia, and Kosovo, it finds that the region is not abandoning the liberal peace but evolving into a hybrid security order, characterized by the decoupling of economic integration from security alignment. Strategic hedging emerges as the dominant behavioral pattern, enabling states to combine EU-oriented integration with increased security autonomy. This transformation reflects the internal erosion, rather than collapse, of the liberal peace, producing a semi-autonomous and increasingly volatile regional security configuration.
Keywords: Western Balkans, strategic hedging, liberal peace, regional security complex, EU integration, militarization; stabilitocracy

7. Parasocial – From the Psychological to the Viral Concept: Dynamics of a Word Within the Contemporary Digital Culture – ID54

Laura Diana Cizer[1], Carmen Luminita Cojocaru[1]
[1]Romanian Naval Academy

Abstract: Cambridge Dictionary chose "parasocial" as the Word of the Year 2025, thus showcasing the transformation of the term from an academic concept to its use on a daily basis due to the ever-growing interest in unilateral relationships with celebrities, influencers and even AI (e.g. chatbots). Therefore, this paper sets out an investigation into the lexical dynamics of the term parasocial, by analyzing its migration trajectory from the academic and psychological jargon into the everyday

lexicon to be widely used in the contemporary digital culture. Building on the initial definition of parasocial relations put forth by Donald Horton and R. Richard Wohl in 1956, we started exploring the psychological factors – one-way attachment and familiarity effect – and the social factors – participative culture, micro-celebrity and digital hyper exposure – which contributed to the widespread use of the term as well as its semantic shift. Furthermore, the analysis of digital communities and "stan culture" phenomenon highlights the way parasocial relationships turn into collective, shared experiences, and how the term gains pragmatic functions of evaluation and self-boundary drawing. Therefore, the suggested empirical consists of a questionnaire that was administered to a number of students at the Romanian Naval Academy of Constanta, which aimed to pinpoint the perception and the use of the forementioned term in a military and academic context. The results have revealed the fact that the extended lexicalization of the term "parasocial" reflects the language adaptation to the transformations of digitally mediated human relationships which confirm the relevance of an integrated language, psychological, and social approach.

Keywords: parasocial, semantic shift, psychology, digital culture, relationships

8. Operational and Strategic Protection of Offshore Platforms in the Black Sea – ID62

Raluca Antoanetta Tomescu[1]
[1]Romanian Naval Academy

Abstract: As a Black Sea coastal state, by joining the European Union, Romania has assumed the declared responsibility of emphasizing the security mission of the eastern border of Europe. With the discovery of massive gas deposits in the Exclusive Economic Zone and the start of the exploitation of these reserves, new valences were added to Romania's security mission, the operational and strategic protection of offshore platforms operating in the Black Sea being among the priority objectives, these representing perhaps some of the most vulnerable objectives. Some time ago, in a European Union document, it was noted that "accidents that occur at sea know no borders", and such an incident, caused intentionally or accidentally, at offshore platforms, would obviously have an catastrophic impact, with devastating consequences in the long or very long term. I therefore believe that the operational and strategic protection of offshore platforms operating in the Black Sea is an essential concern in national strategies regarding ensuring the security of operational personnel, environmental protection and, last but not least, national and European energy security.
Therefore, the need to protect these structures rewrites the approach to security strategies, now more than ever, given the complex set of military, terrorist threats, technological accidents or cyber attacks, in the current international context.

Keywords: offshore, security, environmental

9. The Mediating Role of Self-Concept in the Relationship Between Familial Narrative Practices and Autobiographical Memory: Implications for Discipline, Responsibility, and Adaptation to Hierarchical Contexts – ID69

Ana Delia Rogobete[1], Dora Rogobete[2], Stefania Loredana Nita[3], Marius Rogobete[4]
[1]Insituto Italiano per gli Studi Filosofici
[2]Babeș-Bolyai University
[3] "Ferdinand I" Military Technical Academy, Romania
[4] "Titu Maiorescu" University, Romania

Abstract: This paper adopts a theoretical perspective to examine the mediating role of self-concept in the relationship between familial narrative practices and autobiographical memory. Drawing on narrative psychology and self-development theories, the paper conceptualizes parental and familial narrative styles as foundational mechanisms for meaning-making and autobiographical organization. It argues that these narrative interactions contribute to the internal coherence of autobiographical memory, which supports the formation of a stable and integrated self-concept. In turn, self-concept is proposed as a key psychological mediator underlying mature behavioral outcomes, such as discipline, responsibility, and adaptation to hierarchical contexts. By integrating narrative, cognitive, and socialization frameworks, the paper highlights the long-term developmental significance of narrative environments for adaptive functioning across educational, organizational, and institutional settings.

Keywords: Self-concept, Familial narrative practices, Autobiographical memory, Behavioral regulation, Adaptation to military hierarchies

10. Multimodality and TransDisciplinarity to Enhance ESP Teaching for Erasmus Military Students – ID98

Mariana Boeru[1]
[1]Romanian Naval Academy

Abstract: This paper examines the integrated use of multimodality and transdisciplinarity to enhance the teaching and learning of English for Specific Purposes (ESP) for Erasmus military students. Drawing on relevant theoretical frameworks and recent research, it explores how combining diverse semiotic modes with cross-disciplinary perspectives can improve learner engagement and comprehension. The study focuses on a specialized course on military English terminology and concepts delivered at the Romanian Naval Academy. The course incorporates textual, visual, auditory, and interactive resources, alongside content from military practical trainings to address learners' professional and linguistic needs. The paper presents selected good practices, instructional strategies, and lessons learned from this experience. Findings indicate that integrating multimodality and transdisciplinarity enhances motivation, supports the

acquisition of specialized terminology, and contributes to the development of both linguistic and professional competencies in ESP contexts.
Keywords: multimodality transdisciplinarity, ESP, military English

11. Enhancing Communicative Competence in Maritime English: A Pedagogical Evaluation of the Coursebook English Language in Use for Navy Students– ID112

Gabriela Eftimescu[1]
[1]Romanian Naval Academy

Abstract: This paper offers an in-depth evaluation of the coursebook English Language in Use for Navy Students, with particular emphasis on its pedagogical design and its effectiveness in fostering narrative and descriptive competence within the domain of maritime English. In the contemporary context of globalization and NATO integration, English proficiency has become a critical operational skill for military personnel engaged in multinational missions and joint exercises. The study employs a qualitative content analysis approach, examining the structure, methodological framework, and linguistic components of the coursebook. Special attention is given to the integration of listening, grammar, vocabulary, and speaking activities, as well as their implementation within realistic military scenarios. The findings demonstrate that the coursebook successfully bridges general English instruction with specialized maritime communication, promoting both linguistic accuracy and communicative fluency. Furthermore, the material reflects key principles of English for Specific Purposes (ESP) and communicative language teaching, particularly through its use of authentic contexts and task-based activities. The study concludes that the coursebook represents a highly relevant and effective pedagogical tool for naval education, contributing to the development of professional communication skills essential for operational performance.
Keywords: maritime English; ESP; communicative competence; naval education; language teaching

III. MECHANICAL ENGINEERING SECTION

1. Coupled Analysis of Radial Power Distribution and Neutron-Induced Damage in a Nuclear Ramjet Reactor Core – ID2

Yordan Katsarov[1]
[1]"Georgi Benkovski" Bulgarian Air Force Academy

Abstract: Advanced nuclear ramjet propulsion concepts require accurate characterization of how fission power, neutron spectrum, and radiation-induced material degradation vary spatially within compact, high-power-density reactor cores. This work presents a Monte Carlo neutronic analysis of a ring-resolved honeycomb fuel configuration representative of a solid-core nuclear ramjet engine. Spatially resolved fission-energy and fast-neutron tallies are used to quantify radial trends in power generation and displacement-damage potential. The results reveal a distinctly edge-peaked behavior: both volumetric fission power and fast-neutron flux increase monotonically toward the periphery of the core. This outward shift arises from neutron streaming, spectral hardening, and reflector return currents, which collectively enhance fission and fast-flux levels in the outer rings. The cumulative power distribution confirms that the majority of the total thermal output originates near the core boundary, identifying the outer rings as the dominant contributors to thermal-hydraulic loading. The fast-flux profile exhibits a similar radial trend, indicating that radiation-damage constraints and thermal constraints are co-located in the peripheral fuel regions. These findings underscore the importance of ring-wise neutronic resolution for capturing non-intuitive spatial behavior in compact propulsion reactors. The methodology provides a physically transparent basis for assessing material lifetime, cooling requirements, and structural integrity in future nuclear ramjet designs.

Keywords: nuclear ramjet propulsion, Monte Carlo neutronics, radiation damage, high temperature materials

2. Advanced Technologies in Aeronautical Engineering – ID3

Danail Damyanov[1], Hristo Chuklev[1]
[1]"Georgi Benkovski" Bulgarian Air Force Academy

Abstract: The article presents modern technologies in aeronautical engineering and examines their impact on the development of the aviation industry and air transport. These technologies reduce carbon emissions, optimize flight operations, and increase safety through advanced materials and systems. Key innovations in the aerospace and defense industry include the application of artificial intelligence, immersive technologies, additive manufacturing, the Internet of Things, electric propulsion, sustainable aviation fuels (SAF), hydrogen fuel cells, and robotics.

Keywords: aircraft, technology, development

3. Research on the Possibility of Optimizing the Technology for Repairing Aircraft Skin by Riveting Based on Strength Criteria

Hristo Chuklev[1], Danail Damyanov[1]
[1]"Georgi Benkovski" Bulgarian Air Force Academy

Abstract: Flight safety plays a decisive role in passenger comfort and security. It primarily depends on the reliability of aircraft. During operation, this reliability is maintained by the effectiveness of repair technology and the quality of repairs. The introduction of new repair technologies and the optimization of existing ones is a key moment in this process. For this reason, the present study examines the possibility of optimizing a well-known technology for structural aircraft repair, such as aircraft fuselage repair by riveting. The article presents the methodology, experiment, and results of a study conducted to optimize the repair technology for aircraft structural components. The significant factors for the quality of repair by riveting are determined. A full-scale experiment was planned and conducted to study the strength of a thin-walled reinforced panel simulating aircraft skin. Several different reinforcement and riveting options were tested. The maximum destructive stresses for the different riveting design options have been determined. The results obtained are presented in tabular and graphical form. The relevant conclusions and findings related to the study have been made.

Keywords: technology, aviation, crack, flight safety, riveting, stress and strength, yield

4. Status of Optical Assets in the Context of Constellation of Artificial Satellites – ID27

Andreea-Cătălina Pop[1], Dan Alin Nedelcu[2], Mirela-Mădălina Trelia[1], Mirel Bîrlan[3]
[1]University of Bucharest, Romania
[2]Astronomical Institute of the Romanian Academy, Romania
[3]Romanian Academy

Abstract: Our era is marked by the unprecedented extension of artificial objects orbiting Earth. Most of them are owned by the same provider and this marks the new paradigm of artificial satellite constellations. This paper examines the use of ground based optical sensors for monitoring artificial space objects within the context of Space Situational Awareness (SSA) and Space Domain Awareness (SDA). This outlines the main types of optical sensors and instruments, highlighting their capabilities and limitations for observing objects in LEO, MEO, and GEO orbits, as well as their importance in the definition of satellites ephemerides. The paper presents the telescopes in Romania employed in the research, focusing on their technical characteristics and observational role in tracking artificial objects. The study is focused on the contribution of optical observations to the assessment of satellite astrometry, its attitude and overall

behavior, particularly in the context of proximity events (conjunctions) and orbital dynamics.
Keywords: artificial space objects, ground based optical sensors, optical observations

5. Classification of Mobile Robots for Rescue Operations – ID30

Yanko Boyanov[1], Orlin Petrov[1], Tsvetelina Georgieva[1]
[1]"Angel Kanchev" University of Ruse, Bulgaria
Abstract: Search and rescue (SAR) operations in disaster environments are often hindered by hazardous conditions, limited accessibility, and strict time constraints. Despite advances in disaster risk reduction, events such as earthquakes continue to result in significant loss of life, highlighting the need for improved rescue technologies. In this context, mobile rescue robots have emerged as a promising solution to support and enhance traditional SAR efforts while reducing risks to human responders. This study proposes a classification of ground-based mobile robots used in rescue missions based on their distinctive features. A structured methodology was applied, including planning, literature review, analysis, and synthesis of recent research. Key aspects examined include locomotion mechanisms, control methods, application tasks, communication systems, and power supply types. Existing classification approaches were analyzed and integrated into a unified framework. The proposed classification provides a systematic overview of rescue robots without evaluating their performance. It contributes to a better understanding of their diversity and supports future research and development in rescue robotics.
Keywords: Rescue robotics, Disaster response

6. Hydrodynamic Noise Assessment on Military Ships – ID31

Beazit Ali[1], Adriana Sporiș[1], Levent Ali[1]
[1]Romanian Naval Academy
Abstract: The reduction of under-water noise is one of the most difficult tasks facing the naval architect of military ships. Specific fluid dynamics software has become an important tool for supporting the design of military ships, not only with respect to the minimization of the resistance of the hull, but also with respect to the optimization of the ship propulsion and the reduction of under-water signatures.
The most critical regions for generation of under–water noise are located near the openings, appendages, propellers and rudders. The interaction aspects between ship hull and propeller as well as between the different appendages should also be considered. The scope of this research is optimization of the propulsion system from the hydrodynamic point of view especially with respect to high efficiency, minimum cavitation low pressure fluctuations and noise levels.

Keywords: under-water noise, propeller blades, the rudder, the appendages, vortex, pressure reduction

7. Gas Turbine Propulsion Systems for Naval Vessels: Energy Flow Calculation Methodology and High-Pressure Rotor CFD Simulation – ID45

Octavian Narcis Volintiru[1], Adrian Popa[1], Daniel Marasescu[1], Doru Cosofret[1], Ionut Cristian Scurtu[1]
[1]Romanian Naval Academy

Abstract: This paper addresses the modernization of naval propulsion systems through the adoption of gas turbine technology, with emphasis on thermodynamic calculation methodology and rotor flow simulation. The study is centered on the Rolls Royce gas turbine, employed in naval propulsion applications and covers all thermodynamic states from atmospheric air intake through the two-stage compression process, combustion chamber, high-pressure and low-pressure turbine stages, to the power turbine exhaust. Key parameters, including mass flow rates, stage temperatures, pressure ratios, stage power outputs, and overall thermal efficiency ($\eta = 0.337$), are systematically derived using polytropic compression relations and energy balance equations. In the second part of the paper, a 3D model of the gas turbine high-pressure rotor is developed in SolidWorks and subjected to CFD flow simulation. Three rotational speed regimes are analyzed, 500 rad/s, 750 rad/s, and 1000 rad/s, with corresponding inlet boundary conditions of temperature, pressure, and velocity. The simulation results reveal total pressure drops across the rotor of 1.1%, 1.64%, and 2.3% respectively, consistent with increasing energy extraction at higher rotational speeds. Convergence of total pressure at both rotor inlet and outlet confirms numerical stability across all cases. The results provide a quantitative basis for performance assessment and design optimisation of naval gas turbine rotors.

Keywords: gas turbine, energy flow, Rolls Royce, CFD simulation, rotor, thermodynamic efficiency

8. Numerical Investigation of Frangible Core Configurations for Projectile Impact on Steel Armor – ID53

Ionuț-Mirel Nană[1], Constantin Enache[1], Florin-Marian Dîrloman[1]
[1]"Ferdinand I" Military Technical Academy

Abstract: This paper presents a numerical study regarding the performance of a designed frangible projectile using ANSYS-based simulations. The projectile consists of a steel body and ogive, incorporating a tungsten frangible core. Two core configurations were evaluated: a single-piece configuration and a segmented configuration composed of five identical assembled elements. The computational analysis focuses on the projectile-target interaction during impact on steel plates, emphasizing target perforation, core fragmentation, fragment dispersion, and

velocity evolution throughout the penetration. The simulation results indicate that core geometry has a significant impact on the fragmentation response and post-impact dispersion characteristics. In comparison with the single-piece configuration, the five-piece configuration exhibits enhanced fragmentation efficiency, producing a greater number of fragments within a comparable dispersion area. Moreover, the segmented core offers additional advantages from a manufacturing standpoint. These results indicate that the five-piece frangible core as the more effective configuration for the proposed projectile design.
Keywords: numerical simulation, ANSYS software, frangible projectile, core configuration

9. New Challengers, Onboard Carbon Capture and Storage OCCS for Military Ships – ID56

Ionel Popa[1], Narcis-Octavian Volintiru[1], Doru Coșofreț[1]
[1]Romanian Naval Academy
Abstract: The concept of onboard carbon capture (OCC) is based on technology which captures the carbon on board the vessel before the CO2 is emitted to the atmosphere through the exhaust. While it offers flexibility and retrofit potential, some significant engineering, logistical, and economic hurdles remain. Studies show that the technology can be applied safely on vessels, but it still needs to be further developed and optimized for maritime use and integration. Key factors that affect the technical feasibility of onboard carbon capture for a dedicated vessel are the size, operational profile and hul pattern, the machinery capacity for power and heat production, and the space available. We are interested to these technologies to application for a navy purpose for reduction a smoke from exhaust.
Keywords: carbon capture, combustion, absorption, membrane separation, CO2 desublimation, CO2 anti-sublimation, cryogenic CO2 separation

10. Software for Strut Buckling Optimization – ID66

Mihai Bejan[1]
[1]Romanian Naval Academy
Abstract: The paper presents a software designed to dimension of a compressed column, with a ring – shape cross section, considering the buckling as the most restrictive criterion. The dimensioning must always performed in such a way that optimum to be achieved. The main effort was to define the physical problem. The common buckling calculus is the global one. Improving the solution considering only this constraint will violate the shell buckling one. Another three conditions rise from the physical reality which impose that the mean diameter and the column thickness to be positive and the inner hole to exist, which means that the mean diameter to be higher than the column thickness.
Keywords: Software, strut buckling optimization, global buckling, shell buckling

11. Numerical Investigation of Thermofluidic Performance of a Solar Collector Tube for Maritime Applications – ID90

Elena-Rita Avram[1], Alexandru Cotorcea[1], Nafiz Kahraman[2], Dragoș-Ionuț Simion[1], Alexandru Pintilie[1]
[1]Romanian Naval Academy
[2]Ercyes University, Turkey

Abstract: The main objective of this paper is to evaluate the thermofluid behavior and operational performance of a solar collector tube under conditions relevant to maritime applications. The increasing demand for reducing fuel consumption and improving energy efficiency in ships and port facilities has intensified interest in solar thermal systems for auxiliary energy supply. In this study, a numerical model of a heated tube representative of a solar collector is developed in COMSOL Multiphysics using a coupled Multiphysics approach that integrates fluid flow and heat transfer. Water is considered as the working fluid, and simulations are carried out for different inlet flow rates under a constant heat flux applied to the tube wall. The results demonstrate the significant influence of flow rate on temperature distribution, outlet temperature, and pressure losses, highlighting a trade-off between thermal performance and hydraulic efficiency. Lower flow rates result in higher temperature increases, whereas higher flow rates improve heat extraction but lead to reduced temperature rise and increased pressure drop. The analysis indicates the existence of an optimal operating range that ensures efficient heat transfer while maintaining moderate pumping requirements. The findings provide relevant insights for the design and operation of solar thermal systems in maritime environments.

Keywords: solar collector tube, heat transfer, laminar flow, COMSOL Multiphysics, maritime applications

12. Characteristics of Combat Drones Used in Current Military Operations– ID93

Paul Burlacu[1], Alexandru Pintilie[1], Radu Manu[1], Jenel Vătămanu[1]
[1]Romanian Naval Academy

Abstract: In the current context of the Russian-Ukrainian conflict, it has been proven that the drone without human personnel on board (Unmanned Vehicle - UV), whether airborne, maritime or land, represents a formidable weapon of the combat forces. Depending on the basic characteristics, dimensions, load capacity, speed, range, flexibility, ease of operation and costs, these combat means present real advantages in achieving operational objectives, regardless of the category of forces to which they belong. The objective of this paper is the theoretical approach, with an applicative impact in the military operational sphere, resulting in the

identification of important directions in the development of the combat capability of UV.

Keywords: unmanned aerial vehicle, unmanned surface vehicle, unmanned underwater vehicle, unmanned ground vehicle, first person view, combat drones

13. Machine Learning Applications in Marine Diesel Engines: A Review of Performance Optimization, Emissions Prediction and Fault Diagnosis – ID99

Mihnea-Gabriel Grosu[1]
[1]Romanian Naval Academy

Abstract: This paper presents a review of the current state of the art of machine learning applications on diesel engines, with direct relevance for propulsion systems and marine engineering applications. Given the increasingly stringent requirements for reducing pollutant emissions and increasing energy efficiency in the naval sector, classical modeling and control methods are limited by the complexity and nonlinearity of thermal processes. Machine learning techniques offer advanced solutions for modeling and improving these processes, allowing the analysis of large volumes of operational data from engine operation. In the case of the paper, the main research directions in the recent literature are analyzed, including the use of artificial neural networks, support vector machines and ensemble methods for emission prediction, performance optimization and diagnosis of marine diesel systems. The advantages of these methods in increasing efficiency and reducing environmental impact, as well as the limitations related to data availability and real-time implementation on board ships, are highlighted. Finally, future research directions are identified regarding the integration of machine learning-based solutions into intelligent marine engine management systems.

Keywords: machine learning, marine diesel engines, performance optimization, emission reduction, intelligent engine management systems

14. The Use of Mobile Phones in Cloud Computing: A Literature Review – ID100

Nicușor - Florentin Folgoș[1], Florin Daniel Anton[1]
[1]National University of Science and Technology Politehnica Bucharest

Abstract: This paper aims to examine the role of mobile phones in cloud computing through a literature review perspective. The increasing demand for flexible, accessible, and sustainable computing solutions has encouraged researchers to explore the wider use of mobile devices in distributed computing environments. In this context, the study investigates how mobile phones can contribute to the development of cloud computing and to the transformation of digital infrastructure. The research is based on a literature review of scientific

articles indexed in international database, focusing on publication trends and the main research directions in the field. The results indicate a growing research interest in the use of mobile phones in cloud computing and underline their potential relevance for future computing infrastructures.
Keywords: mobile phone, cloud computing, distributed computing, digital infrastructure

15. Study on the Possibility of Optimizing Technology for Repairing Aircraft Skin Using Riveting According to Quality Criteria – ID105

Hristo Chuklev[1], Danail Damyanov[1]
[1]"Georgi Benkovski" Bulgarian Air Force Academy

Abstract: Flight safety plays a decisive role in passenger comfort and security. It mostly depends on the reliability of the aircraft. During operation, this reliability is maintained by the effectiveness of repair technology and the quality of the repair. The implementation of new repair technologies and the optimization of existing ones is a key aspect of this process. For this reason, this study examines the possibility of optimizing a well-known technology for aircraft structural repair, namely the repair of the aircraft fuselage using riveting. The article presents the methodology, the experiment, and the results of a study conducted to optimize the repair technology for aircraft structural components. The significant factors affecting the quality of riveted repairs have been identified. A full-scale experiment was planned and conducted to investigate the strength of a thin-walled reinforced panel simulating the aircraft skin. Several different reinforcement and riveting configurations were tested. The maximum failure stresses for the various riveting configurations have been determined. An optimization problem for multidimensional optimization using the Simplex method has been formulated. The results obtained are presented in tabular and graphical form. The relevant conclusions and findings related to the study have been drawn.
Keywords: technology, aviation, crack, flight safety, riveting, stress and strength, yield

16. Enhanced Performance in Transmission Electron Microscopy through Electron Precession Systems – ID106

Radu Manu[1], Dumitru Corduneanu[1], Paul Burlacu[1], Alexandru Pintilie[1], Jenel Vătămanu[1], Florin Postolache[1], Elena Stoica[2], Razvan Mateescu[2], Corneliu Porosnicu[2], Victor Ciupina[3]
[1]Romanian Naval Academy
[2]National Institute for Marine Research and Development "Grigore Antipa"
[3]Academy of Scientists from Romania

Abstract: The integration of electron precession systems into Transmission Electron Microscopy (TEM) has significantly improved the accuracy and

reliability of crystallographic and structural investigations at the nanoscale. By stabilizing the precession angle and minimizing mechanical and electronic drift, these systems enable the acquisition of high-quality diffraction patterns with reduced dynamical scattering effects. The resulting data allow for more precise measurements of lattice parameters, strain distributions, and defect structures, which are critical for the study of thin films and nanomaterials. Comparative experiments on amorphous, polycrystalline, and epitaxial samples demonstrate substantial gains in reproducibility, resolution, and analytical depth. These advancements establish electron precession as a powerful enhancement to TEM, opening new opportunities for research in semiconductors, functional coatings, and advanced nanostructured materials. In order to highlight the improvement of the results obtained by the optimized system, we performed a study that was applied to a series of samples with different compositions and crystal structures. The first sample shown is a thin film of Amorphous Carbon. The next two materials having a face-centered cubic structure, Gold and Aluminum. The Gold sample is in the form of nanoparticles, while the Aluminum sample is in the form of a polycrystalline film. The results confirm that PED optimization significantly reduces dynamic effects and greatly improves the reliability of phase identification. This work demonstrates that precise control of the precession parameters is essential for the development of electron diffraction methods in the characterization of thin films and provides a promising direction for high-resolution structural characterization at the nanoscale.

Keywords: Transmission Electron Microscopy (TEM), electron beam precession, thin films

17. Aspects Regarding the Quality of Deep-Drawn Parts – Part Two – ID108

Aurelia Chioibaș[1]
[1]Romanian Naval Academy

Abstract: In a previous study, it was argued that parts meeting quality requirements and obtained through the deep drawing process actually exhibit this “quality” as a result of the interaction between two key factors: the technological system and the forming process. For this purpose, three dies were constructed, and the influence of A3K steel strip thickness variation on the quality of the formed part was analyzed. This paper continues the study with two other types of rolled strips: one made of deep drawing steel and the other of brass. Frequency histograms of strip thickness were generated, as thickness variation is a factor that influences the drawing force in the forming of small cylindrical parts.

Keywords: the deep drawing process, the drawing force in the forming of small cylindrical parts, A3K steel and brass strip, frequency histograms of strip thickness

18. Physics Laws Preceding Algorithms: A Justification for the Integrity of Electrical Engineering – ID110

Petrică Popov[1]
[1]Romanian Naval Academy

Abstract: This paper examines the contemporary crisis of "technological imposture" within the field of electrical engineering, a phenomenon rooted in the transition from physics-based fundamentals to empirical models, semi-empirical approximations, and "black-box" algorithms. In this context, an over-reliance on CAD software and Artificial Intelligence risks eroding the physical intuition of engineers, effectively demoting them to mere data operators. By analyzing critical historical events, such as the North American blackouts (1996, 2003), the Jordanian power failure (2004) and the continental Europe system split (2021), this article demonstrates how discrepancies between digital simulations and physical reality can lead to catastrophic infrastructure failures. These case studies underscore the fact that when virtual models bypass physical rigor, the consequences are both systemic and immediate. This paper proposes educational and professional solutions centered on a “Physics-First” strategy by advocating the reinstatement of first-principles analytical derivations and mandatory empirical laboratories as the bedrock of pedagogical formation. Ultimately, the work emphasizes the necessity of a symbiosis in which technology is subordinate to scientific rigor, promoting the concept of Physics-Informed Machine Learning (PIML) as an anchor for the stability and security of future energy systems.

Keywords: first principles, Black Box, Model-Driven, Physics-Informed Machine Learning (PIML)

19. Optimization Frameworks for Magnetic Signature Management of Naval Surface Platforms: A Comprehensive Analysis – ID111

Petrică Popov[1]
[1]Romanian Naval Academy

Abstract: This paper establishes a formal, multidimensional framework for the optimization of magnetic signature management strategies in naval surface platforms, primarily aimed at mitigating the risks posed by the proliferation of sophisticated underwater influence mines and high-fidelity fluxgate-based detection systems. To this end, the investigation commences with an inquiry into the phenomenological underpinnings of naval magnetism, establishing a rigorous distinction between geophysical-driven induced magnetization and the remanent components synthesized during the vessel's distinctive fabrication and operational lifecycle. From a methodological perspective, the paper evaluates the convergence and fidelity of computational electromagnetics, specifically focusing on Finite Element Method (FEM) and Boundary Element Method (BEM) formulations. A pivotal contribution of this analysis is the validation of the Thin Plate Boundary

Condition (TPBC) as a computationally efficient approximation for macroscopic ferromagnetic simulations, facilitating an optimal tradeoff between numerical precision and algorithmic complexity. The assessment of hardware configurations centers on the architectural evolution of Active Degaussing (ADG) systems, tracing the shift from conventional open-loop frameworks to state-of-the-art Closed-Loop Degaussing (CLDG) solutions. This section details the algorithmic synthesis of real-time sensory feedback for the dynamic compensation of perturbations. Furthermore, the efficacy of Flash-Deperming protocols is quantified through the integration of Preisach and Jiles-Atherton hysteretic models, enabling a precise characterization of magnetic saturation and remanence states. Finally, the proposed technical frameworks are cross-referenced with the stringent requirements of NATO STANAG 1163 and 1008 standards, providing an integrated perspective on electromagnetic compatibility (EMC) and tactical survivability within highly contested maritime operational environments.
Keywords: magnetic signature, Closed-Loop Degaussing, Induced and Remanent Magnetization, Magnetic Silencing & Deperming

IV. NAVIGATION, TRANSPORT AND MANAGEMENT SECTION

1. Challenges of Digital Identity in Maritime Sector – ID7

Ioana Petcu[1]
[1]ICI Bucharest

Abstract: Digital identity is increasingly recognized as a critical enabler in the maritime sector, providing seafarers and maritime personnel with secure access to administrative, professional, and regulatory services. The highly mobile and international nature of the maritime workforce makes electronic identification systems (eID) particularly valuable, facilitating processes such as the verification of credentials, management of maritime documentation, and interaction with port authorities and regulatory bodies. Despite these benefits, implementing digital identity solutions in the maritime domain presents several notable challenges. These challenges include ensuring data protection and cybersecurity, addressing unequal access to digital infrastructure during voyages, and accounting for varying levels of digital literacy among seafarers. In addition, the complexity of regulatory frameworks and the need for interoperability across national and international maritime systems add further layers of difficulty. This article addresses the challenges of eID in the maritime sector and highlights the need for secure, accessible, maritime-centered solutions to strengthen a resilient and inclusive digital democracy. Tailoring these solutions to the specific needs of maritime professionals can support the ongoing digital transformation of the maritime industry, thereby enhancing operational efficiency, strengthening regulatory compliance, and improving access to essential services for seafarers worldwide.

Keywords: digital identity, maritime digitalization, seafarers' digital identity management, maritime cybersecurity, maritime governance

2. Impact of Emerging and Disruptive Technologies on Military Decision-Making and Management Processes in Land Forces – ID8

Katarzyna Kurkewicz[1]
[1]Chairwoman of the "STRATEGY" student scientific club, Military University of Technology, Poland

Abstract: Emerging and disruptive technologies such as artificial intelligence, big data analytics, autonomous systems, and digital command platforms are transforming contemporary military management. Modern land forces operate in highly dynamic environments that require rapid, data-driven decision-making and flexible organizational structures. This paper analyzes the impact of these technologies on command processes, resource management, and operational effectiveness. A qualitative review of literature and selected military case studies

was conducted to identify benefits, risks, and implementation challenges. The results indicate that digital transformation improves situational awareness, accelerates decision cycles, and enhances operational resilience, while requiring new competencies, cybersecurity measures, and adaptive leadership models.
Keywords: military management, disruptive technologies, artificial intelligence, decision-making, digital transformation, land forces, operational security

3. Energy Efficiency Measures vs. Biofuels - Implications for Vessel Operational Performance – ID9

Aleksandar Hristov[1], Irina Dilova[1]
[1]"Nikola Vaptsarov" Naval Academy, Bulgaria

Abstract: The purpose of this study is to determine the relative importance of energy saving measures (ESMs) and alternative biofuels for the improvement of ship efficiency and for compliance with new regulations imposed on the maritime transport sector. In light of the fact that ESMs have proven that they are capable of providing a significant fuel saving potential by enhancing the hull condition, propulsion, and internal combustion efficiency as well as through operational optimization, the aim of this study is to investigate the advantages and disadvantages of ESMs compared to biofuels. To this end, a mixed methodological approach was applied, based on the structured analysis of scientific literature, and complemented by semi-structured interviews with maritime engineers, fleet managers, fuel specialists and regulatory experts. The findings show that ESMs provide on average a proven and reliable energy and emissions saving potential, although the degree of this saving potential varies from one measure to another, depending on their complexity, cost and degree of integration. Each of the biofuels examined presents different operational characteristics, as one has a high regulatory value, although it is relatively unstable in deep sea conditions, while the other presents good storage characteristics and engine performance but with limited market availability and high price. Finally, ESMs seem to be the most effective solutions for the improvement of ship efficiency, while the alternative biofuels examined could be considered as part of the compliance strategy of shipowners in cases where their operational characteristics are taken into account.
Keywords: Operational efficiency, Vessel performance, Energy efficiency measures, Biofuels

4. Structural Integrity and Ultimate Strength of Tubular Joints in Naval Architecture – ID10

Dan-Cătălin Birsan[1]
[1]"Dunărea de Jos" University, Galați, Romania

Abstract: Tubular joints are fundamental components in the design of offshore platforms, naval vessels, and marine superstructures, offering high strength-to-

weight ratios and excellent hydrodynamic efficiency. However, these structures are continuously exposed to complex, multiaxial environmental loads, making their welded intersections highly susceptible to severe stress concentrations and localized yielding. This paper investigates the structural integrity and ultimate strength of typical welded tubular joints (e.g., T, Y, and K configurations) utilized in naval architecture under extreme static and dynamic loading conditions. A comprehensive methodology combining non-linear Finite Element Analysis (FEA) and scaled experimental testing was employed to evaluate the elasto-plastic response, load-bearing capacity, and primary failure mechanisms of the joints. The results demonstrate that the ultimate strength is heavily dictated by geometric parameters, specifically the brace-to-chord diameter ratio (β) and the wall thickness ratio ( ), with chord face plastification and punching shear emerging as the dominant failure modes. Furthermore, the validated numerical models were used to assess the reliability of current industry design codes (such as API and DNV), proposing refined parametric equations that offer enhanced predictive accuracy. The findings of this study provide critical insights for optimizing the geometric design, mitigating structural failure, and extending the operational lifespan of tubular frameworks in harsh marine environments.

Keywords: tubular joints, ultimate strength, finite element analysis (FEA), naval architecture, structural integrity, offshore structures, failure mechanisms

5. Vortex-Induced Oscillations in Offshore Structures. A Case Study on Helideck Dynamics – ID11

Dan-Cătălin Birsan[1], Elena-Adina Birsan[2]
[1]"Dunărea de Jos" University, Galați, Romania
[2]"Virgil Madgearu" National College of Galati, Romania

Abstract: The primary objective of this study is to investigate the dynamic response and structural integrity of offshore helicopter landing platforms subjected to wind-driven vortex-induced oscillations. Marine and offshore structures operate in harsh environmental conditions where strong, continuous air currents pass through their tubular supports, creating alternating shedding vortices. This aerodynamic phenomenon can induce severe structural vibrations that accelerate material fatigue and compromise the overall safety of the platform. To evaluate this critical vulnerability, a coupled numerical approach was applied, combining three-dimensional fluid flow simulations to model the wind behavior around the lattice framework with computational structural analysis to extract natural frequencies and mechanical stresses. The results demonstrate a clear synchronization between the wind shedding frequency and the natural frequency of the supporting framework at specific critical wind speeds, initiating destructive resonance. Additionally, the analysis reveals that mechanical stress heavily concentrates near the base joints of the platform during these synchronized vibration events. The

study concludes that integrating targeted aerodynamic deflectors into the support design successfully suppresses these harmful oscillations, thereby extending the structural lifespan and ensuring the safety of maritime aviation operations.
Keywords: vortex, oscillations, helideck structure

6. A Multi-Criteria Evaluation Approach for Identifying Critical Zones in Maritime Traffic on the Danube–Black Sea Canal – ID17

Cristina Alecse[1], Livia Rauca[1]
[1]Romanian Naval Academy

Abstract: Navigation on inland waterways plays a significant role in the European transport system, supporting both logistics efficiency and sustainable freight transport. The Danube–Black Sea Canal represents a key strategic link between the Danube River and the Port of Constanța, yet increasing traffic intensity has raised concerns regarding navigational safety and localized operational vulnerability. This study proposes an integrated framework combining statistical incident analysis with the multi-criteria decision-making method ELECTRE to identify and prioritize critical canal sectors. The analysis is based on real incident data provided by the Administrația Canalelor Navigabile (ACN) for the period 2021–2024. Results indicate that operational risk is primarily driven by incident severity and blockage potential rather than frequency alone. The Locks area and the Km 11–20 sector are identified as critical zones, while sector S2 (Km 2.5–10) emerges as the most efficient. The findings support targeted risk mitigation and improved traffic management strategies.
Keywords: Danube-Black Sea Canal, navigational safety, operational risk, critical zone

7. Comparative Analysis of Parametric Diagnostics-Based Energy Efficiency Assessment Methods for Inland Vessels – ID19

Tetyana Tarasenko[1], Vitalii Zalozh[1]
[1]Danube institute of National university, Odessa Maritime Academy

Abstract: Inland vessel energy efficiency indicators for ships in operation remain poorly regulated and are still being investigated at different regulatory and research levels. This paper focuses on the ongoing efforts to define suitable forms of energy efficiency indices for self propelled inland vessels and pusher tugs operating on inland waterways, with particular attention to the European context. A comparative analysis of several existing methods for assessing operational energy efficiency indices is carried out, highlighting their main assumptions and limitations. It is shown that most current approaches do not adequately account for the actual technical condition of main engines, which can significantly affect real fuel consumption, delivered power and thus operational energy efficiency. The study considers the application of parametric diagnostics of main engines to refine key

working process parameters. This provides a physically grounded basis for continuous monitoring of ship energy efficiency in service. The paper further justifies the need for developing a transformation-based method that incorporates parametric diagnostics results to construct realistic fuel consumption, power and speed profiles for inland vessels, thereby improving the reliability and practical relevance of energy efficiency assessment in inland navigation.
Keywords: inland waterway transport, energy efficiency, diesel engines, parametric diagnostics, engine working process, portable diagnostic systems

8. Artificial Intelligence and Income Distribution – ID24

Gheorghe Grecu[1]
[1]Romanian Naval Academy
Abstract: An extremely important and widely studied topic at a global level is the impact of automation technologies such as artificial intelligence (AI) and robotics on the human workforce through employment and, implicitly, through distortions in income distribution. In this paper, we address the issue of the impact of artificial intelligence on income distribution in a theoretical approach to the current situation, using specialized studies in the field. A society that is not willing to support the necessary transition and provide support to those who have not adapted to the development of technology should expect resistance to innovation, with uncertain political and economic consequences.
Keywords: Artificial Intelligence, Technological Progress, Income Distribution, Employment

9. Meteorological Impact Assessment Software for Maritime Transport in The Western Part of the Black Sea – ID39

Miruna-Georgiana Ichim[1], Dinu-Vasile Atodiresei[2], Cătălin Popa[2], Marius Cucu[2], Lucian Dumitrache[2]
[1]University of Bucharest
[2]Romanian Naval Academy
Abstract: Maritime transportation in the western part of the Black Sea is strongly affected by meteorological conditions such as wind, waves, and visibility. This paper presents a software system designed to evaluate and predict these impacts using real-time and historical data. The system integrates data processing, statistical analysis, and predictive models to assess navigational risks and support route optimization. A user-friendly interface provides visual insights and scenario simulations for maritime stakeholders. Results demonstrate improved decision-making, enhanced safety, and reduced operational disruptions, highlighting the value of meteorological data integration in maritime transport systems.
Keywords: maritime transportation, meteorological factors, decision-support systems, Black Sea, weather impact

10. A Satellite-Based Analysis of War-Induced Marine Pollution in Romania's Black Sea Waters (2022–2025) – ID48

George Novac[1]
[1]Romanian Naval Academy

Abstract: This study leverages high-resolution satellite imagery and geospatial data to quantify the environmental degradation of the Romanian Black Sea sector during the 2022–2025 Ukraine conflict. By analyzing multi-spectral imagery, the research maps the spatio-temporal distribution of oil slicks, maritime debris, and suspended sediments originating from military activities and damaged coastal infrastructure in the northern basin. The methodology focuses on the southward drift patterns that bring toxic runoff and hydrocarbons into Romania's Exclusive Economic Zone (EEZ) and the fragile Danube Delta Biosphere Reserve. Results indicate a significant correlation between high-intensity naval engagements and a decline in chlorophyll-a levels and water turbidity standards along the Romanian coast. The paper concludes that satellite-based civilian oversight is a critical tool for documenting transboundary environmental crimes and for planning post-conflict ecological restoration in the Western Black Sea.

Keywords: war-induced ecotoxicity, romanian coastal pollution

11. Reducing Insider Threat and Human Error in Maritime Operations through Continuous Behavioral Authentication – ID37

Calin Sandu[1], Ciprian Răcuciu[1]
[1]"Ferdinand I" Military Technical Academy

Abstract: Maritime digital ecosystems are increasingly composed of interconnected devices and information systems that support navigation, control, communication and operational management. Although access to these systems is typically protected by conventional authentication mechanisms, identity verification occurs only at the beginning of a session. Once access is granted, there is no assurance that the same legitimate operator continues to interact with the system. This limitation creates a significant cybersecurity and safety gap in environments where human interaction with digital equipment has direct operational consequences. This paper explores the concept of continuous behavioral authentication as a complementary cybersecurity layer for maritime operations. Rather than relying solely on static credentials or isolated biometric checks, the proposed approach is based on the continuous analysis of behavioral patterns generated naturally during interaction with digital devices. These patterns (such as keyboard typing rhythm and dynamics, touchscreen pattern usage and motion sensor signals) form a distinctive behavioral profile that can be used to verify operator identity throughout the entire session. The central idea of the paper is the definition of a multi-device behavioral identity model, capable of correlating

interaction data collected from different devices within the same operational ecosystem. By treating behavioral interaction as a dynamic identity signal, the approach enables persistent identity verification without interrupting the user's workflow. This conceptual framework aims to reposition behavioral biometrics from a single-device authentication method to a systemic, ecosystem-level identity verification mechanism applicable to safety-critical maritime environments.
Keywords: Cybersecurity, behavioral authentication, multi-device, identity verification, biometrics

12. Optimizing the Positioning of Sensors for Fire Detection – ID42

Gabriel Prodan[1]
[1]Ovidius University, Constanța, Romania
Abstract: Aging or improperly installed electrical installations can be a source of fire starting. To prevent fires, a series of systems has been developed that allow quick measures to be taken in such situations. In this paper, we aim to streamline the response of a smoke sensor by properly positioning it in a location with known geometry. Several factors can influence the moment of sensor activation, including the ventilation system, the location of fire initiation, and the geometry of the location. The study uses the Fire Dynamics Simulator, complemented by a Python application that enables the generation of scenarios necessary to obtain the results for the optimization analysis. Thus, maps are generated with smoke concentrations and temperature for a room where the source of the fire varies in location, thus obtaining the necessary data for the analysis algorithm to establish the optimal positioning and number of sensors to get an improved response from fire protection system.
Keywords: fire, FDS, SMV, smoke sensors, temperature sensors

13. Cyberattacks in Maritime Shipping as a Challenge to Safety and Risk Management – ID47

Katarzyna Kurkiewicz[1], Seweryn Bołdak[2]
[1]Military University of Technology - Chairwoman of the "KNS Strategy" Scientific Club, Poland
[2]Veteran
Abstract: The development of digital technologies in maritime shipping, including navigation, communication, and ship and port management systems, has significantly increased transport efficiency while simultaneously introducing new cybersecurity threats. Modern vessels and port infrastructure are increasingly dependent on integrated information systems, making them vulnerable to cyberattacks. The aim of this paper is to analyze cyber threats in the maritime sector and their impact on operational safety and supply chain continuity. The study discusses the most common types of attacks, such as ransomware, phishing, and

disruptions to navigation systems (e.g., GPS spoofing), and presents selected real-world incidents in the maritime industry. Particular attention is given to cybersecurity risk management, including threat identification, risk assessment, and the implementation of preventive measures. The role of international regulations and security standards in mitigating the effects of cyberattacks is also highlighted. The conclusions indicate that effective cybersecurity management requires a systemic approach that combines technological and organizational solutions, including crew training and the development of incident response procedures.

Keywords: cybersecurity, maritime shipping, risk management, ship information systems, port infrastructure, cyber threats, transport safety

14. AI-Enabled Autonomous Area-Keeping for Underwater Vehicles – ID49

Marius Rogobete[1], Marius Iulian Mihailescu[2], Stefania Loredana Nita[3], Valentina Marascu[2], Mara Rogobete[4]
[1]Harman International
[2]"Spiru Haret" University, Constanța, Romania
[3]"Ferdinand I"Military Technical Academy
[4]"Babes-Bolyai" University, Romania

Abstract: Autonomous Underwater Vehicles (AUVs), commonly known as submarine drones, provide a critical capability for modern naval operations requiring persistent presence in contested and GPS-denied environments. This paper addresses autonomous positioning and area-keeping of AUVs within predefined underwater zones using integrated inertial, acoustic, and velocity-based navigation systems. Artificial intelligence techniques, including machine learning–based sensor fusion and adaptive decision-making, enhance state estimation, navigation robustness, and control performance in uncertain and dynamic environments. By combining AI-enabled perception with robust control algorithms, AUVs can maintain precise station-keeping and boundary awareness while compensating for ocean currents and environmental disturbances. These capabilities support force protection, intelligence gathering, and undersea surveillance missions, enabling discreet and sustained operations with minimal human intervention.

Keywords: Autonomous Underwater Vehicles (AUVs), Artificial Intelligence, Area-Keeping, GPS-Denied Navigation, Sensor Fusion, Acoustic Navigation, Station-Keeping, Undersea Surveillance, Maritime Security

15. The Impact of the Persian Gulf Conflict on Maritime Transport Security and Global Supply Chains – ID55

Dumitru Corduneanu[1], Romeo Bosneagu[1], Lucian Dumitrache[1]
[1]Romanian Naval Academy

Abstract: This paper provides a comprehensive scientific analysis of the 2025–2026 Iran-related conflict and its impact on maritime transport systems and global supply chains. It integrates economic data, maritime risk modelling, and comparative crisis analysis. The study highlights nonlinear effects generated by chokepoint disruptions, including capacity loss, cost escalation, and systemic vulnerability. A resilience-based framework is proposed.

16. The Paradigma of Maritime Sustainability and the Evolution of the MARPOL Regulatory Framework – ID57

Cristina-Andreea Tudor[1]
[1]Romanian Naval Academy

Abstract: Maritime transport of goods has been the central pillar of global trade, representing over millennia the optimal solution for the transit of large volumes of goods over intercontinental distances. At the same time, the ecological footprint of this sector is considerable, with naval activies generating systemic pollution of the environment in general and the aquatic environment in particular. The harmful impact that can manifest itself through daily operational exploitation or accidental incidents has catastrophic effects, leading to accelerated degradation of ecosystems, endangering marine biodiversity and generating major risks to public health. MARPOL remains the main international convention for the prevention of pollution of the marine environment by ships, wheter accidental or operational, adopted by the International Maritime Organization (IMO) in 1973, to which Romania accedet, ratifying it trough Law No. 6/193 under the auspices of the Romanian Naval Authority. At the International level, the concern for a sustainable environment therefore remains a fundamental priority, being addressed mainly in maritime industry strategies, their congruence as an ideal, achieving a balance between business interests, human needs and the planet's resources.
Keywords: pollution, maritime transport, MARPOL, ecosystem, environment.

17. Optimization of Maritime Routing Using AI and AIS Data for Emission Reduction and Navigational Safety. Black Sea Case Study – ID58

Dumitru Corduneanu[1]
[1]Romanian Naval Academy

Abstract: This paper develops a comprehensive AI-based maritime routing optimization framework using AIS data, with application to the Black Sea. The study integrates multi-objective mathematical modeling, and data-driven simulation to minimize fuel consumption, emissions, and collision risk. Results

indicate fuel savings of up to 22% and significant safety improvements. The methodology aligns with the decarbonization targets of the International Maritime Organization.

18. A Comparative Study on Optimizing Positioning Accuracy in Coastal and Submerged Topography Using Modern Technologies – ID60

Lucian Dumitrache[1], Dinu Atodiresei[1], Andra-Teodora Nedelcu[1], Romeo Boșneagu[1], Dumitru Corduneanu[1], Florian Gheorghe[2]
[1]Romanian Naval Academy
[2]SC Topominiera SRL

Abstract: This paper presents a comparative analysis of modern methods used to optimize positioning accuracy in coastal and submerged topography, with a focus on the integration of the Topograf Online application, RTK GPS technology, and underwater positioning systems such as Underwater GPS. The study highlights how these technologies contribute to increasing the accuracy of topographic data, reducing errors, and streamlining workflows in marine engineering applications.
The results show that integrating intuitive software solutions with high-performance hardware systems enables centimeter-level accuracy even in submerged environments where the GPS signal is unavailable.

19. High-Resolution Seabed Survey Using Autonomous Underwater Vehicles for Submarine Cable Route Assessment – ID61

Lucian Dumitrache[1], Romeo Boșneagu[1], Andra-Teodora Nedelcu[1], Sergiu Șerban[1], Dumitru Corduneanu[1], Alexandru Gurița[1]
[1]Romanian Naval Academy

Abstract: The expansion of offshore renewable energy projects and subsea communication networks has increased the demand for accurate seabed investigations along a submarine cable route. Route surveys play an essential role in identifying seabed conditions, detecting potential hazards for existing cable. Autonomous Underwater Vehicles (AUVs) have become an effective platform for such surveys due to their ability to operate close to the seabed and acquire high-resolution geophysical data. This project examines the use of an AUV for submarine cable route surveys, focusing particularly on the processing and interpretation of the collected data. The study presents the main objectives of this type of mission, including bathymetric mapping, identification of seabed features, detection of man-made objects, and assessment of sediment characteristics along the cable route.The paper briefly describes the typical sensor configuration of an AUV used in offshore surveys, including multibeam echosounder, side scan sonar, sub-bottom profiler, and magnetometer, together with the navigation systems that ensure accurate positioning of the collected data. Special attention is given to the data processing workflow, which transforms raw survey measurements into

meaningful geospatial information. This includes navigation corrections, noise filtering, bathymetric surface generation, sonar mosaicking, and target detection analysis. The final survey outputs typically consist of digital terrain models, sonar mosaics. The study highlights how AUV-based surveys provide detailed seabed information that supports the inspection, monitoring, and condition assessment of existing submarine cables, contributing to safer and more efficient maintenance and management of subsea infrastructure.

Keywords: AUV (Autonomous Underwater Vehicles), seabed, submarine cable, bathymetry, geophysical data, data processing

20. Integrated Risk Assessment and Simulation-Based Training for Safe Navigation in the Black Sea under Emerging Maritime Threats – ID63

Sergiu Lupu[1], Alecu Toma[1], Andrei Pocora[1], Silviu-Nicolae Popa[1], Cătălin Popa[1], Constantin Pintilie[2], Adrian Drăgușan[3]
[1]Romanian Naval Academy
[2]BlueSpace TECHNOLOGY
[3]Ecole Nationale Superieure Maritime

Abstract: The security context in the Black Sea has changed significantly following the outbreak of the war in Ukraine, leading to the emergence of new and complex risks for maritime navigation. Among the most important are drifting sea mines, GNSS signal disruptions, and the operational limitations of mine countermeasure activities. This paper analyses these risks from an integrated perspective, highlighting their interdependence and their impact on both commercial and military navigation. Particular attention is given to drifting mines, which represent a persistent and unpredictable hazard across the region. Based on this analysis, the study proposes a set of simulation-based training solutions aimed at improving situational awareness and decision-making. A series of training scenarios has been developed using Full Mission Bridge simulators and VR/MR technologies, including applications for EOD teams. The results suggest that simulation-based training can significantly enhance preparedness and contribute to safer navigation in complex and high-risk maritime environments.

21. From Parametric to Contextual Assessment in Maritime Simulators: The Evolution from TEAS to e-Tutor – ID64

Sergiu Lupu[1], Alecu Toma[1], Andrei Pocora[1], Silviu-Nicolae Popa[1], Cătălin Popa[1], Constantin Pintilie[2], Adrian Drăgușan[3]
[1]Romanian Naval Academy
[2]BlueSpace TECHNOLOGY
[3]Ecole Nationale Superieure Maritime

Abstract: Maritime simulators play a key role in training and assessing cadets' operational competencies, especially within the framework of the STCW

Convention. Traditionally, evaluation has relied on instructor-based assessment, which, although comprehensive, introduces a degree of subjectivity and variability. The integration of automatic assessment systems, such as the Transas Evaluation and Assessment System (TEAS), used by older versions of Navi-Trainer Pro (NTPro) simulator software, has improved objectivity by applying rule-based evaluation using measurable navigation parameters. Previous studies have shown that TEAS reduces variability and increases consistency compared to instructor assessment. However, its predominantly parametric approach limits the ability to capture complex decision-making processes and dynamic behaviours. In this context, the e-Tutor module, implemented in the latest versions of NTPro, represents a natural evolution, maintaining the Boolean logic foundation of TEAS while significantly increasing the complexity and flexibility of rule-based evaluation. This paper analyses the transition from TEAS to e-Tutor, highlighting the shift from parameter-based rules to more complex structures that integrate multiple variables, temporal conditions, and system responses. As a result, assessment moves towards a contextual and behaviour-oriented approach.
The findings indicate not only a technological advancement but also a methodological shift towards more realistic and standardised evaluation, aligned with STCW requirements.
Keywords: maritime simulators, automatic evaluation and assessment, rule-based evaluation, behavioural assessment

22. Optimizing Transport and Logistics Chains through Modeling and Simulation – ID70

Alexandru Cotorcea[1], Stefania Rusu[1], Florin Nicolae[1]
[1]Romanian Naval Academy
Abstract: Modern supply chain management is facing unprecedented complexity, requiring the transition to resilient and sustainable networks. This article aims to analyze the current state of research on the integration of optimization and simulation methods, such as Digital Supply Chain Twin tools, for the assessment of what-if scenarios, risk mitigation and carbon footprint reduction. Also, the paper proposes a methodological framework for a case study applied in Romania, modeling the logistics flow from the Port of Constanta to national distribution centers. The case study demonstrates how tools such as Green Field Analysis and dynamic simulation can support strategic decision-making to balance costs, response times and environmental sustainability during disruptions.
Keywords: transport, supply chain, simulation, optimization

23. Environmental Impact Associated with Grain Transportation Systems from the Producer to the Port of Shipment – ID71

Florin Nicolae[1], Alexandru Cotorcea[1], Dragoș Simion[1], Cosmin Partene[1], Manuela-Ștefania Rusu[1]
[1]Romanian Naval Academy

Abstract: This research proposes a model for estimating emissions resulting from grain transport activities from the producer to the port of shipment. The authors identified the operational logistics storage centers within the grain production region of Dobrogea and, based on the actual field situation, delimited the agricultural areas served by these centers. In this study, various transport scenarios between the logistics storage centers and the port of shipment terminals were developed. Each scenario is analyzed based on fuel consumption and associated carbon dioxide emissions. The results can be used for the preliminary assessment of the environmental impact associated with road transport systems for grain from the producer to the port of shipment.

Keywords: grain transportation, truck transport, transportation scenarios, port of shipment, environmental impact

24. Ultrasound Technologies in Support of Ballast Water Treatment on Board Ships – ID72

Dinu Vasile Atodiresei[1], Maria Popa[1], Miruna-Georgiana Ichim[2], Cătălin Popa[1], Alecu Toma[1], Elena Robe[1], Oana Marcu[1], Andra Nedelcu[1]
[1]Romanian Naval Academy
[2]University of Bucharest, Romania

Abstract: This paper examines the challenges of ballast water treatment on board ships. While international maritime trade provides major economic benefits, it also facilitates the uncontrolled transfer of invasive aquatic species through ballast water, causing ecological imbalances that impact biodiversity, human health, and the economy. In response, the International Maritime Organization introduced the Ballast Water Management (BWM) Convention, requiring ships to install certified treatment systems. The study analyzes general treatment principles and a case study on the Mary Maersk, focusing on system performance in difficult conditions such as turbid waters. It also proposes integrating ultrasound technology to improve efficiency. By generating acoustic cavitation, ultrasound can disrupt microorganisms and prevent biofilm formation, maintaining effective disinfection with minimal additional energy consumption, while supporting environmental protection.

Keywords: ballast water treatment, marine environmental protection, Ballast Water Management (BWM) Convention, ultrasound technology

25. Analyzing Congestion Dynamics at a Bulk Cargo Pier Using Queueing Theory – ID73

Livia Rauca[1]
[1]Romanian Naval Academy

Abstract: This study applies M/G/1 queueing theory to assess the operational dynamics of a bulk cargo terminal in Constanța Port. Modeling the berth as a single-server process under First-Come, First-Served (FCFS) logic, the paper analyzes multi-year vessel data to interpret system utilization and variability. The results demonstrate that congestion is fundamentally driven by traffic intensity, exhibiting the classic non-linear behavior predicted by queueing models. A key finding is that service-time variance significantly amplifies waiting times during high-load periods. Through scenario analysis, a high sensitivity to capacity constraints is identified, but it suggests that optimizing service efficiency can mitigate these effects. The research highlights the importance of preserving a 'stability buffer' to prevent the system from entering a state of rapid congestion escalation.

Keywords: pier efficiency, queueing system, port congestion

26. Modeling and Simulation Methods in the Maritime Industry: Evolution, Applications, and Future Perspectives – ID74

George-Cosmin Partene[1], Florin Nicolae[2], Florin Postolache[2], Alexandru Cotorcea[2], Dragoș Simion[2]
[1]National University of Science and Technology Politehnica Bucharest
[2]Romanian Naval Academy

Abstract: Modeling and simulation (M&S) techniques have evolved from optional engineering tools to indispensable pillars of modern maritime practice. This article presents a comprehensive systematic review of the most important modeling and simulation methodologies applied to maritime industry processes, including workflows for ship design, shipyard fabrication and construction, port and terminal operations, vessel traffic management, maintenance scheduling, supply chain logistics, and risk management procedures. The study demonstrates that M&S techniques enable safer, more efficient, and more environmentally sustainable operations, validated by scientific standards. The COVID-19 pandemic served as a critical catalyst, consolidating the strategic value of M&S as a central component of maritime resilience and innovation. This research traces the evolution of M&S adoption from 2010 to 2025, identifying four dominant research directions: maritime simulators, computational fluid dynamics (CFD)/finite element analysis (FEA), digital twins, and artificial intelligence-based methods. The analysis reveals that while traditional approaches dominated the 2010-2020 period, emerging technologies—particularly digital twins and AI-based methods—have accelerated exponentially since 2020, reflecting the maritime industry's accelerated

digitalization. Forward projections through 2035 indicate that AI-based methodologies will experience the highest growth rate at approximately 329%, followed by digital twins at 147%, underscoring the fundamental transformation of maritime research and practice. The integration of these advanced modeling approaches offers optimal equilibrium between physical precision and computational efficiency for addressing complex maritime challenges.
Keywords: modeling and simulation, digital twins, artificial Intelligence, maritime digitalization, maritime industry

27. Advancing Bulk Port Performance Using Virtual Scenario Analysis – ID77

Ștefania-Manuela Rusu[1], Elena Fleacă[1], Alexandru Cotorcea[2], Florin Nicolae[2], Dragoș Simion[2]
[1]National University of Science and Technology Politehnica Bucharest
[2]Romanian Naval Academy
Abstract: This study propose a virtual scenario analysis, integrating queuing theory and discrete-event simulation (DES), to optimize resource allocation in dry bulk ports. By modeling stochastic vessel arrivals and machinery dynamics, the research identifies operational bottlenecks within berthing and material handling systems. The results indicates that proper equipment synchronization is essential for minimizing waiting times and improving performance. The proposed framework offers a practical method to maximize existing port infrastructure.
Keywords: bulk port operation, resource allocation, queuing theory, discrete-event simulation, operational efficiency

28. Current Trends in Acoustic Modeling and Research Priorities in Military Oceanography – ID78

Romeo Bosneagu[1], Lucian Dumitrache[1], Dinu Atodiresei[1], Sergiu Serban[1], Dumitru Corduneanu[1], Andra Nedelcu[1]
[1]Romanian Naval Academy
Abstract: Underwater acoustic modelling is one of the central methodological components of military oceanography, as the performance of sonar systems, detectability estimation, source localization, and ambient noise analysis depend on a realistic representation of the marine environment. The literature highlights a clear transition from simplified, quasi-static models to integrated, distance-dependent approaches that include the spatial variation of the geoacoustic properties of sediments, the seasonality of the thermohaline structure, and the dynamic updating of environmental parameters through multi-source data fusion. This paper develops an analytical framework dedicated to modern acoustic modelling in support of military oceanography, with a focus on four major directions: the integration of sedimentological and geoacoustic data into

propagation models, the use of seasonal and synoptic sound speed profiles, the development of an integrated digital acoustic model of the digital twin type, and the definition of research priorities for naval and coastal applications. Both the contributions of established physical models—the parabolic equation method, normal modes, and full-wave simulations—and the role of machine learning-based surrogate models, capable of substantially reducing computational costs and facilitating near-real-time updates of predictions, are critically analysed. The analysis shows that the operational value of acoustic modelling increases significantly when it is treated as an adaptive system, with explicit uncertainty estimation and continuous integration of data from CTD measurements, gliders, AUVs, satellite observations, and in situ acoustic observations. Looking ahead, the paper advocates for the need for experimental campaigns focused on bottom sediments, the development of seasonal atlases of sound speed, the use of satellite observations to expand the spatial context of oceanography, and the development of autonomous networks and the Underwater Internet of Things to support military acoustic modelling.

Keywords: underwater acoustics, military oceanography, range-dependent modelling, geoacoustics, sound speed profile, digital twin, Underwater Internet of Things

29. Leadership as a Performance Multiplier of Logistics Operations in VUCA Environments – ID82

Armindo Frias[1], Miguel Machado da Silva[1], Ivo Soares[1], Pedro Borda de Água[1]
[1]CINAV, Escola Naval, IUM, Almada (PORTUGAL). & ISEG Research, ISEG Instituto Superior de Economia e Gestão, Universidade de Lisboa (PORTUGAL)

Abstract: The armed forces operate in a VUCA environment, where military logistics play a crucial role in readiness and sustainment of forces. This study analyses the influence of leadership on logistics performance, identifying causal mechanisms such as prioritization, network coordination, risk management, and the development of a culture of discipline and learning. Through a review of the literature and the authors' professional experience, this study explores the theoretical frameworks of leadership (command and control, transactional, situational, transformational, distributed and high reliability organizations) and the main skills of logistics leaders, such as systems thinking, decision-making in conditions of uncertainty and digital competence. It is concluded that leadership is a critical performance factor, impacting the different actors and stakeholders to improve the reliability, resilience and legitimacy of logistics systems in adverse environments.

Keywords: Cross-functional collaboration, Leadership skills, Logistics performance, Military leadership, Risk management

30. Bridging the Gap: Immersive Technologies and Active Learning in Modern Naval and Maritime Education – ID83

Armindo Frias[1], Pedro Borda de Água[1], Vítor Conceição[2], Ivo Soares[1], Miguel Machado da Silva[1]
[1]CINAV, Escola Naval, IUM, Almada (PORTUGAL). & ISEG Research, ISEG Instituto Superior de Economia e Gestão, Universidade de Lisboa (PORTUGAL)
[2]Chalmers University of Technology, Göteborg (SWEDEN). & CINAV, Escola Naval, IUM, Almada (PORTUGAL)

Abstract: Maritime professionals operate in complex, high-risk environments, requiring both technical and non-technical skills, as well as a systemic understanding of socio-technical interactions. This study, through a historical-prospective perspective and a critical review of the literature, analyses Maritime Education and Training (MET), identifying pedagogical gaps in both formal shore-based training and practical on-board learning. The evolution of MET, from experiential models to standardised and technological systems, reveals that increasing automation shifts the focus towards critical thinking, digital literacy and behavioural skills, whilst keeping the human element central. The aim is to assess whether active learning methodologies, supported by immersive technologies (simulation, virtual and augmented reality), can reintroduce situated practice in a safe and extendable manner. The article contributes to the creation of a holistic teaching model, arguing that future MET systems should adopt hybrid, competence-based models, integrating classroom instruction, immersive environments and supervised on-board experience. With regard to maritime and naval higher education, international course accreditation criteria must be adapted to the reality and specific nature of this sector.

Keywords: Maritime education and training (MET), Blended learning, Active learning methods, Naval education, Pedagogical innovation

31. Rethinking Port Governance Models: Public-Private Partnerships and Competitive Dynamics in Global Terminal Operations – ID84

Filip Nistor[1], Cătălin Popa[1]
[1]Romanian Naval Academy

Abstract: Port governance has undergone an intense transformation over the past three decades, with landlord and hybrid models emerging as the predominant institutional frameworks. These models have redefined the role of port authorities, shifting their functions from direct service provision to regulatory oversight and asset management, while facilitating the mobilization of private capital. Public–private partnerships (PPPs) and concession arrangements have consequently become central mechanisms for infrastructure development; however, their performance remains uneven and highly contingent upon contextual factors. In

parallel, global terminal operators (GTOs) have expanded through processes of corporatization, mergers, and concession acquisitions, leading to increasingly concentrated market structures and raising concerns regarding market power, accessibility, and network resilience. This study argues that the effectiveness of port governance reforms is critically dependent on the alignment between regulatory capacity and evolving markets configurations. Furthermore, the growing concentration of GTOs is associated with both potential efficiency gains and significant risks, including the exercise of market dominance, diminished competitive pressures, and heightened barriers to market entry.

Keywords: port governance, terminal operator, market concentration, PPP

32. Ports, Sustainability, and Decarbonisation: Developing a Portfolio of PORTable Innovations – ID87

Maria Șerbănescu[1], Dragoș Simion[1]
[1]Romanian Naval Academy

Abstract: In addition, the Deliverable provides an outlook on the planned activities for the third year, including which search areas will be expanded with a special emphasis on greening innovations in ports outside the EU. In addition, the innovation scouting will put more effort into the search area of innovations with no link to port regimes yet in order to gain a more comprehensive approach to identify niches and assess their impact on European port regimes according to the multi-level perspective (MLP) framework. Therefore, the project innovation scouting team will involve more partners with specific fields of expertise to assure a broader approach to the activity. In addition, the process steps "Filtering, analysing and interpretation of data and evaluation and decision-making of the innovation scouting will be further elaborated with the help of the criteria catalogue developed with the support of WP 8 and WP 9 to further assess the greening potential of innovation selected by the innovation forum and to map the results into a the PORT initiative Innovation radar as a part of the online documentary PORTfolio of Portable innovations.

As a result, the link of the innovation scouting to the MLP-framework underlines the importance of the scouting results as input to the GPMP development in WP 2. In addition, the six steps of the introduced technology scouting process proved to be a viable framework to define relevant search areas, detect valuable information sources and as a starting point to collect and structure the gathered data and information. Thereby, different identified search areas and information sources are introduced and collected data and information has been mapped into a sustainable port framework in order to test the structural capabilities of the framework to categorise complementary or substitutional innovations as well as detect white areas in comparison to the PORT initiative innovations. In this regard, the

framework is assessed to be suitable in the first test round and will be used in the further scouting activities.
Keywords: innovation, port initiative, sustainability

33. Action Plan for Maximizing Synergies and Innovations in Ports – ID88

Maria Șerbănescu[1], Dragoș Simion[1]
[1]Romanian Naval Academy
Abstract: This Action Plan for Maximizing Synergies serves as a strategic framework to identify and strengthen connections across all ports involved. By mapping ongoing and potential projects among port partners, it provides a comprehensive view of innovations related to port decarbonization efforts. This integrated perspective not only enhances understanding but also sets the stage for new cross-port innovation opportunities.
The plan outlines practical recommendations to foster collaboration, improve knowledge exchange, and better align related initiatives. Rather than working in isolation, ports are encouraged to build on each other's efforts and experiences. The action plan helps to spot meaningful connections and linkages across the port network — opening up new pathways for cooperation and maximizing the overall impact of the project.
Keywords: port ecosystem, decarbonization, alternative fuels

34. Cross-industry integration of AI-Driven Predictive Maintenance: Applications in Maritime Transport – ID89

Dragoș-Ionuț Simion[1], Alexandru Cotorcea[1], Florin Nicolae[1], Florin Postolache[1], George Partene[2]
[1]Romanian Naval Academy
[2]National University of Science and Technology Politehnica Bucharest
Abstract: The maritime industry is undergoing a profound transformation, transitioning toward Shipping 4.0 and the emergence of Autonomous Robotic Organizations (AROs). Traditionally, maintenance operations have relied on reactive and preventive strategies, which account for approximately 40% of a vessel's total operational expenditure (OPEX) and fail to prevent nearly 50% of maritime accidents attributed to mechanical failures. This study investigates the cross-industry transfer of Artificial Intelligence (AI)-driven Predictive Maintenance (PdM), drawing strategic insights from the manufacturing and energy sectors. In smart manufacturing, industry leaders such as GE and Siemens have achieved up to 15% reductions in maintenance costs and a 30% decrease in unplanned downtime through AI-enabled real-time monitoring. Similarly, in the energy sector, deep learning models have demonstrated failure prediction accuracies exceeding 90%. Applying these methodologies to Cyber-Enabled Ships

(CESs) requires addressing unique maritime challenges, including non-inertial platforms operating under six degrees of freedom (6-DoF) and "denied environments" characterized by high satellite latency. This paper explores the integration of Machine Learning (ML), Deep Learning (DL), and Digital Twin technologies to optimize the Remaining Useful Life (RUL) of critical systems.
Key innovations—such as "Hull Foresight" for structural integrity monitoring and Federated Learning (FL) for decentralized data management and privacy—are examined as essential enablers of autonomous maritime operations. Despite the potential to reduce maintenance-related OPEX by up to 45%, significant technical challenges remain, including data quality issues ("dirty data"), the opaque nature of deep learning models ("black-box" problem), and a persistent skills gap. The study concludes that the future of maritime transport lies in hybrid architectures that combine physics-based models with Explainable AI (XAI), thereby enhancing operator trust and ensuring regulatory compliance in safety-critical environments.
Keywords: Maritime Transport, Predictive Maintenance (PdM), Artificial Intelligence (AI), Machine Learning (ML)

35. Study on Equipping Conventional Tugboats with Carousel Towing Systems – ID91

Alexandru Pintilie[1], Mihaela-Greti Manea[1], Elisabeta Buzilă[1], Paul Burlacu[1], Elena-Rita Avram[1]
[1]Romanian Naval Academy
Abstract: Conventional tug design can be characterized by keeping the hull direction in line with the towing wire and rotating the thrust force 360 degree around. The carrousel tug design can be characterized by rotating the hull direction free from the towing wire. Carrousel tug consists of a large horizontal ring, rotating around the accommodation and fitted with the towing wire. The attachment in the side reduces the heeling moment sharply and enables to use the full extent of the dynamic hull forces for escorting (steering and braking). This paper describes a brief analysis of the carrousel towing system amd comes with proper arguments for implementing it on conventional tugs, for large improvements in operational performance and safety.
Keywords: tug, propulsion, stability, heeling, carrousel, lift, drag

36. OCTOPUS – Computerized Instrument for the Dynamic Behavior Analysis of the Ship on the Sea. Case Study for the "Mircea" Training Ship – ID92

Alexandru Pintilie[1], Mihaela-Greti Manea[1], Paul Burlacu[1], Elisabeta Buzilă[1]
[1]Romanian Naval Academy
Abstract: The paper addresses one of the difficult problems faced by navigating officers during ship operation – oscillatory movements generated by the influence

of the navigation environment.It is well known that the oscillatory movements (rolling and pitching) must have compliant values (amplitudes of angles of inclination) that meet the requirements of the nautical quality of oscillating smoothly. The originality of the work is given using OCTOPUS software in the analysis of the roll and pitch movements of the Training Ship "Mircea", in the navigation conditions of the Black Sea. For the computerized study, the wave spectra and Response Amplitude Operator spectra of the ship were graphically illustrated, considering the state of load of the ship, the speed of movement of the ship as well as the angle of encounter with the incident wave system.
Keywords: OCTOPUS software, roll and pitch, wave specter, Response Amplitude Operator

37. Trends and Structures in the Digitalization of Managerial Processes in Industrial Organizations: A Bibliometric Analysis – ID94

Raluca Loghin[1], Bogdan Fleacă[1]
[1]National University of Science and Technology Politehnica Bucharest, Romania
Abstract: The digitalization of managerial processes in industrial organizations is a topic of growing interest, given the technological, economic, and organizational changes that have shaped the industrial environment in recent years. The article addresses the digitalization of managerial processes as an important dimension of organizational development and examines the main research directions in this field. The study is based on a bibliometric analysis of scientific articles indexed in an international database. The bibliometric analysis highlights trends, and the main thematic directions that shape the development of this research field. The study concludes that the digitalization of managerial processes represents an expanding area of research with significant relevance for the future development of industrial organizations.
Keywords: digitalization, managerial processes, industrial organizations

38. Higher Education Quality Requirements in the Context of Industrial Management Digitalization: A Literature Review – ID95

Aurelia - Georgiana Radu[1], Raluca Loghin[1], Elena Fleacă[1]
[1]National University of Science and Technology Politehnica Bucharest, Romania
Abstract: In the current context of globalization, digitalization is a key strategic factor that involves the use of new technologies in organizations' internal processes to increase efficiency, improve the user experience, and transform business processes. This paper aims to analyze how industrial digitalization impacts quality requirements in higher education. Higher education institutions are in the process of adapting to the integration of technologies, while an increasing number of organizations are utilizing digital management systems, performance monitoring, and data-driven decision-making processes. Thus, the external environment

imposes constraints on the adaptability of educational organizations to current dynamics. In this context, the quality of higher education could be defined in terms of its ability to align with industrial needs. The study is based on a review of the specialized literature, with articles focusing on the concepts of industrial management, digitalization, and quality in higher education institutions. The analysis shows that industrial management digitalization creates new quality requirements for higher education.
Keywords: Digitalization, Industrial management, Higher Education

39. A Bibliometric Analysis of Research on Cyberattacks Risk Mitigation –ID101

[1]Adrian Ștefan Toader
[1]National University of Science and Technology Politehnica Bucharest
Abstract: Risk management and IT security are now strategic priorities for both enterprises as well as national and international decision-makers due to the growing frequency and sophistication of cyberattacks. At the intersection of risk governance, critical infrastructure protection, and the development of security technology, cyber risk mitigation has emerged as one of the most active areas of cybersecurity research. Emerging technologies like blockchain, artificial intelligence, machine learning, and zero-trust architecture, together with regulatory frameworks like NIST CSF, NIS2, and DORA, are changing how organizations identify, evaluate, and mitigate cyber threats. Based on 563 publications that were indexed in the Scopus database between 2015 and 2025, this study offers a bibliometric analysis of the literature on cyber risk reduction. VOSviewer (version 1.6.20), RStudio (version 4.5.3) with the Bibliometrix package and the Biblioshiny interface, and Microsoft Excel for data organization and verification were used for the analysis. The findings demonstrate a consistent increase in scientific publications, with peaks in fields like cyber risk governance and management, machine learning-based threat detection, artificial intelligence integration into security, and the creation of critical infrastructure protection architectures. The development of new fields of study as well as the maturity of the field's methodological core were reflected in the identification of several theme clusters. The geographical distribution supports the predominance of research from United States, Saudi Arabia, India, and the United Kingdom. The results provide an overview of trends in the field of cyber risk mitigation and serve as a useful reference point for researchers and practitioners in identifying priority areas of study and gaps in the current literature.
Keywords: Cybersecurity, cyberattack risk mitigation, bibliometric analysis, risk management

40. Strategies to Increase of Managerial Performance at Maritime Navigation Company – ID103

Florin Iordanoaia[1]
[1]Association "Education and Staff Training"

Abstract: This paper supports managers from shipping companies, to help them choose strategies and tactics of action for the development of companies, for investments, adaptation to the new requirements of the maritime market and in accordance with the trends of the shipping industry. It falls under the managerial strategies for large and very large, multinational companies, because shipping companies, through their entire activity, can no longer be called "national", because they carry out their activity on all seas and oceans, employ sailing personnel from several countries and including managers at the company headquarters, have different nationalities. In this regard, within the framework of the paper, a study and analysis was carried out at a shipping company, a series of strategies and methods for business development, for solving the situations that companies are going through, were sought in order to face current challenges. A study was carried out on the use of Artificial Intelligence at the company headquarters and on board shipping vessels.

Keywords: strategy, performance, manager, maritime ship

41. A Perspective on the Evolution of International Maritime Transport and the Ports of the Future – ID104

Romeo Bosneagu[1], Sergiu Serban[1], Sergiu Lupu[1], Dinu Atodiresei[1], Lucian Dumitrache[1], Dumitru Corduneanu[1], Andra Teodora Nedelcu[1]
[1]Romanian Naval Academy

Abstract: International maritime transport continues to be the backbone of global trade, accounting for the largest share of global goods traffic in terms of volume. In recent years, the sector has evolved under the simultaneous influence of the reconfiguration of logistics chains, geopolitical tensions, climate constraints, and the acceleration of digitalization. This paper analyzes the evolution of international maritime transport and its relationship to the transformation of ports, based on UNCTAD statistical series for the period 1960–2025, supplemented by official documents from the IMO, the European Commission, the EEA, EMSA, and the World Bank. Methodologically, the research combines a longitudinal analysis of the volume of cargo transported by sea and global fleet capacity, correlation and regression analysis, as well as a comparative analysis of recent indicators regarding port performance, connectivity, digitalization, and decarbonization. The results highlight that, following the decline in 2022, global maritime trade increased to 12,292 million tons in 2023 and to 12,720 million tons in 2024, while the growth rate of the ton-mile indicator exceeded the physical growth rate of transported volume, suggesting longer routes and increased logistical complexity. The

correlation between the volume of goods transported and the capacity of the global fleet remains very high, confirming the derived nature of demand for maritime transport. In this context, the port of the future is envisioned as a smart logistics hub with integrated commercial, energy, digital, and informational functions, adapted to new requirements for competitiveness and sustainability.
Keywords: international maritime transport, maritime trade, global fleet, smart ports, port digitization, decarbonization

42. Integrated Analysis of Wave Conditions and Storm Events Near the Danube Delta – ID107

Dragos Marin[1], Dragos Niculescu[1], Gulten Reiz[1], Elena Vlasceanu[1], Radu Manu[2], Razvan Mateescu[1]
[1]National Marine Research and Development Institute ”Grigore Antipa”
[2]Romanian Naval Academy
Abstract: Understanding wave dynamics along the Romanian Black Sea coast depends on consistent and well-placed field observations. In this work, wind and wave conditions near Sulina Arm were monitored using a Spotter beacon, with further comparisons being made with similar instruments installed at Mamaia and Eforie. A central objective of the present work was to explore how storm events—the intensity and frequency of which appear to change—shape coastal processes and influence wave behavior throughout the year. Measurements of significant wave height, wind speed, and direction were examined to determine when storms occurred, how long they persisted, and whether they affected multiple locations simultaneously. To complement these observations, flow values for the three main arms of the Danube Delta were estimated for the year 2025, using proportions derived from field measurements made in 2024. The approach combined beacon data processing, inter-site comparison and wind-wave correlation together with flow distribution calculations. The results indicate slightly higher wave exposure in the Sulina area, a clear predominance of northerly winds, and storm events that tend to be shorter but more intense. The maximum flow of the Danube generally occurs between April and June. Overall, the results obtained from the aforementioned efforts provide a clearer understanding of how coastal conditions evolve and highlight the need for continuous monitoring in the western sector of the Black Sea.
Keywords: Wave dynamics, Storm variability, Spotter beacon data, Coastal processes, Danube flow

43. Organizational Cybersecurity: A Literature Review of Attack Taxonomies, Vulnerability Factors, and Risk Mitigation Frameworks in Corporate Information Systems – ID109

Adrian Stefan Toader[1], Valentin Ionut Cosmin Dumitrescu[1]
[1]National University of Science and Technology Politehnica Bucharest, Romania

Abstract: As organizations become increasingly dependent on digital infrastructure, cyberattacks targeting corporate information systems represent a growing threat with serious operational and financial consequences. This paper reviews the specialized literature on cyberattacks and their implications for organizational security, focusing on three main aspects: the types of attacks most frequently encountered by companies, the factors that make organizations vulnerable to such threats, and the strategies and frameworks used to reduce cybersecurity risk. The review shows that attacks such as ransomware, phishing, malware, and advanced persistent threats exploit both technical weaknesses and human errors within organizations, highlighting the need for comprehensive and well-structured defense approaches. The analysis further reveals that effective risk mitigation requires not only technical solutions but also strong governance, employee awareness, and clear security policies. Despite considerable progress in research, significant gaps remain in terms of sector-specific solutions and practical implementation guidance. The findings of this review offer a consolidated overview of the current state of knowledge in organizational cybersecurity and provide a useful reference for both researchers and practitioners working to strengthen information systems security.

Keywords: cyberattacks, vulnerability factors, risk mitigation, organizational cybersecurity, information systems security

44. The Naval Transport – Towards Zero Emission Vessels - ID112

Dragoș Simion[1], Andreea Nistor Boonstra[1]
[1]Romanian Naval Academy

Abstract: The new world of global transport, as it looks like today, comes with an awareness of the negative effects of environmental pollutants and with the need of rethinking the transport modes, adapting it to the need to preserve the quality of human life and environmental protection, consistent with an increase in transport demands. The naval transport as significant player in the intermodal transport is also at the core of the new mindset towards nonpolluting and zero emissions fleet. Some first steps have started in 2013 when IMO has imposed a new chapter of MARPOL with certain measures related to energy efficiency in international shipping. Further on, recently, the European Union has expressed its strong will to implement an environmental strategy with key targeted indicators for the gradually decrease of the greenhouse gas intensity of fuels used by the maritime transport to 80% by 2050. It is a fact that the naval transport is currently in a profound state of

transformation, becoming a greener and more reliable transport mode. The current study addresses the environmental aspects in naval transport, the attempts and results of building zero emissions and nonpolluting vessels, the regulations and the subsidies for building of greener vessels.
Keywords: greener transport, zero emission vessels, nonpolluting vessels, regulations, subsidies

<u>Section E:</u> WORKSHOP

PROJECT: CyberSEA - Increasing Cyber Security at SEA through digital training

Erasmus+ Program - KA220-VET - Cooperation partnerships in vocational education and training
2023-1-ES01-KA220-VET-000159793

Workshop „CyberSEA project
Enhancing cybersecurity in the maritime domain"

May 15th, 2026

Project: CyberSEA - Increasing Cyber Security at SEA through digital training - Erasmus+ Program - KA220-VET - Cooperation partnerships in vocational education and training 2023-1-ES01-KA220-VET-000159793

EVENT AGENDA
Friday, May 15th, 2026 - Room L120

08:30-09:00 – Registration for Sea-Conf - Workshop attendance registration, folders distribution, welcome session
09:00-09:30 – Conference opening session (flag rising ceremony)
09:30-10:30 – Sea-Conf Conference - Plenary session
11.00-13:00 – Sea-Conf Conference - Fundamental and Applied Research session
13.00-14.30 – CyberSea Conference - Presentations session
14.30-15.00 – CyberSea Conference - Open discussions (debates, Q&A, closing remarks)

Chairman: Assoc. prof. Andrei Băutu, PhD (Romania)
Members:
LCDR Eng. Andrei Pocora (Romania)
Col. Eng. Eugen-Cătălin Bucur (Romania)

CyberSea project presentation

Andrei Băutu, Andrei Pocora, Eugen-Cătălin Bucur, Cătălin Popa, Cucu Marius - Romanian Naval Academy

Abstract: In the era of Industry 4.0, the maritime sector is undergoing an unprecedented digital transition. As ships become increasingly dependent on interconnected systems, exposure to cyber risks is increasing exponentially. Digital security is no longer just the responsibility of the IT department, but has become a critical pillar for the safety of life at sea, environmental protection and the integrity of global supply chains.

The CyberSEA project was conceived as a strategic response to these emerging challenges. Its objectives are aimed at

- Risk mapping: Identifying and analysing specific vulnerabilities in IT (Information Technology) and OT (Operational Technology) systems on board ships and in port terminals.
- Procedural standardization: Developing cyber incident response protocols adapted to the rigors of the maritime environment.
- Human dimension: Reducing human error — often the "weak link" in security through specialized training programs.

The project methodology combines theoretical research with practical applications. A central point is the use of modern digital learning methods (e-learning, virtual simulations and gamification scenarios), designed to provide future and current seafarers with an immersive and applied learning experience. This approach allows the simulation of cyber attacks (such as GPS spoofing or ransomware attacks) in a controlled environment, preparing personnel for rapid decision-making in crisis situations.

The presentation provides an overview of the main deliverables of the CyberSEA project, including the developed course modules and the feedback collected from the testing sessions. Finally, the perspectives for integrating these solutions into naval academic curricula and mandatory training programs are discussed,

providing a model of best practices for aligning the maritime industry with international digital security standards.

Cybersecurity threats in maritime communication networks

Lakhvir Singh, Vanessa Makar - Centre for Factories of the Future (United Kingdom)

Abstract: This presentation examines cybersecurity threats affecting onboard communication networks, which are critical for data exchange, navigation support, and coordination with external entities. It covers a range of threats including data breaches, communication loss, data manipulation, credential theft, botnet infiltration, and system control takeover, as well as risks such as false vessel identities, navigational errors, and increased collision potential. The analysis highlights how these threats can disrupt communication flows, compromise data integrity, and impact the safe and reliable operation of maritime systems.

Cybersecurity threats in integrated bridge systems

Wili Helenius, Katri-Piia Rajala, Janne Lahtinen - Satakunta University of Applied Sciences (Finland)

Abstract: This presentation explores cybersecurity threats affecting Integrated Bridge Systems (IBS), which support navigation and operational decision-making onboard ships. It focuses on risks such as malicious software attacks that may disrupt or alter system functionality, vulnerabilities associated with the use of remote maintenance services, and the potential leakage of sensitive information related to International Ship and Port Facility Security Code (ISPS). The analysis highlights the potential impact on navigation reliability, system integrity, and the confidentiality of critical security information.

Cybersecurity threats in maritime navigation systems

Wili Helenius, Katri-Piia Rajala - Satakunta University of Applied Sciences (Finland)

Aris Chronopoulos, Lila Anthopoulou - IDEC SA (Greece)

Abstract: This presentation examines cybersecurity threats targeting maritime navigation systems, essential for safe vessel positioning and route planning. It focuses on GPS positioning disturbances that can affect location accuracy, AIS spoofing that may introduce false vessel information, and malicious software impacting ECDIS functionality. The analysis highlights the potential consequences

on navigational reliability, situational awareness, and the safe conduct of maritime operations.

Cybersecurity threats in onboard entertainment systems

Tomaž Gregorič, Saša Ivančič - Spinaker (Slovenia)

Abstract: This presentation examines cybersecurity threats affecting onboard entertainment systems, particularly those connected to passenger-accessible networks. It focuses on Distributed Denial of Service (DDoS) attacks originating from public networks, Man-in-the-Middle attacks that may intercept or alter data exchanges, and brute force attacks targeting system access. The analysis highlights the potential impact on network availability, data confidentiality, and the overall integrity of onboard digital services.

Cybersecurity threats in passenger and crew management systems

George Papadourakis, Konstantinos Karampidis, - Hellenic Mediterranean University (Greece)

Abstract: This presentation examines cybersecurity threats affecting passenger and crew management systems, which handle sensitive personal and operational data onboard ships. It focuses on SQL injection attacks that may compromise or manipulate stored data, phishing and malware campaigns targeting user credentials and system access, Man-in-the-Middle (MITM) attacks that can intercept communications, and Denial of Service (DoS) attacks that may disrupt system availability. The analysis highlights the potential impact on data integrity, confidentiality, and the reliable management of personnel information.

Cybersecurity threats in shipboard power management systems

Monika Klein, Mariusz Dramski - Berlin School of Business and Innovation (Germany)

Germán De Melo Rodriguez - Universitat Politècnica de Catalunya (Spain)

Abstract: This presentation examines cybersecurity threats affecting shipboard Power Management Systems (PMS), focusing on risks such as unauthorized physical access to control rooms and operational technology assets, and security issues related to removable media and uncontrolled data flows. It also considers vulnerabilities arising from insufficient restriction of external interfaces (e.g., USB ports) and unauthorized access to critical power management network

infrastructure. The analysis highlights potential impacts on system integrity, operational continuity, and vessel safety.

Cybersecurity threats in cargo management systems onboard ships

Andrei Băutu, Andrei Pocora, Eugen-Cătălin Bucur - Romanian Naval Academy (Romania)

Abstract: This presentation addresses cybersecurity threats targeting Cargo Management Systems (CMS), essential for the planning and control of cargo operations onboard ships. It focuses on three key threats: ransomware attacks that can block access to critical cargo data, malware that may disrupt or alter system functionality, and phishing emails that can lead to the disclosure of sensitive information or user credentials. The analysis highlights the potential operational impact of these threats, including disruption of cargo handling processes, compromised data integrity, and risks to the safe and efficient management of ship loading activities.

Cybersecurity threats in propulsion and engine control systems

Germán De Melo Rodriguez - Universitat Politècnica de Catalunya (Spain)

Abstract: This presentation outlines cybersecurity threats to propulsion and engine control systems, including unauthorized physical access, risks from removable media and external interfaces, and unauthorized access to main engine network infrastructure. It highlights potential impacts on system integrity and vessel safety.

Cybersecurity threats in satellite communication systems

Izabela Bodus-Olkowska - Maritime University of Szczecin (Poland)
Aris Chronopoulos, Lila Anthopoulou - IDEC SA (Greece)

Abstract: This presentation examines cybersecurity threats affecting satellite communication systems used in maritime operations. It focuses on jamming attacks that disrupt signal availability, spoofing techniques that introduce false satellite signals affecting positioning and communication accuracy, and meaconing, where legitimate signals are intercepted and rebroadcast to mislead navigation or timing systems. The analysis highlights the potential impact on communication reliability, navigational accuracy, and overall maritime operational safety.

Cybersecurity threats in weather monitoring systems

Izabela Bodus-Olkowska, Natalia Wawrzyniak, Ilona Garczyńska-Cyprysiak - Maritime University of Szczecin (Poland)

Abstract: This presentation examines cybersecurity threats affecting weather monitoring systems used in maritime operations for route planning and safety decisions. It focuses on risks such as incorrect weather predictions related to wind, sea state, and atmospheric pressure, distortion of weather map positioning, and the resulting impact on navigation decisions. The analysis highlights how these threats can lead to improper route planning and extended voyage times due to avoidance of perceived severe weather conditions, affecting operational efficiency and safety at sea.