

## ABSTRACT

### MECHANICAL AND ELECTRICAL SCIENCE

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#### ALTERNATIVE FUELS FOR THE MARINE MARKET

**Abstract.** *The shipping industry is facing challenges to reduce exhaust gas emissions and greenhouse gases in particular, carbon dioxide from ships engaged in international trading. The main regulatory body, International Maritime Organization (IMO) and national environmental agencies of many countries have issued regulations that drastically reduce emissions coming from marine sources. Of particular note are regulations in Emissions Control Areas (ECAs) such as the North American ECA, which came into being in 2012, and the SOx Emission Control Areas (SECAs), which have been in effect in the Baltic Sea and North Sea and English Channel since 2006 and 2007, respectively. These new requirements will force ship owners and managers to look into other possibilities like using alternative fuels.*

**Keywords:** *gas emission, distilled fuel, biodiesel.*

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#### ABOUT THE STUDY OF ENERGY'S FLOW FROM ENERGETICALLY NAVAL SYSTEMS

**Abstract:** *In this paper are analyzed energy's flow in energetically naval systems and their correlation with the effective power of thermal machines. The possibilities for secondary energy flows recovering and their impact on the marine environment with possibilities to reduce pollution*

#### LEVENT ALI, ION-ADRIAN GIRBA, ANASTASE PRUIU, DANIEL MARASESCU

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#### ABOUT THE MAINTENANCE OF THE HEAT FLOW EXCHANGERS FROM ENERGETICALLY NAVAL SYSTEMS

**Abstract:** *The paper presents the main activities of maintenance that ensures the operating characteristics of the fluid used to transfer energy flows. Through their adequate treatment and maintain quality exchangers surfaces energy flows through periodic cleaning with or without disassembly.*

**Keywords:** *heat exchanger, fouling, overall heat exchanger temperature, corrosion.*

#### PAUL BURLACU, PETRICA POPOV, FLORENTIU DELIU, VASILE DOBREF, MITRUȚ C. CARAIVAN

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#### THE STEADY-STATE SIMULINK MODEL OF THREE-PHASE ASYNCHRONOUS MOTOR USED ONBOARD A SHIP

**Abstract:** *A ship plant consisting in a three-phase AC asynchronous motor is well known onboard a ship. The steady-state numerical model helps to study the transitory phenomena's regarding power supply network.*

**Keywords:** *asynchronous motor; numerical model*

#### PAUL BURLACU, FLORENTIU DELIU, VASILE DOBREF, PETRICA POPOV, MITRUT C. CARAIVAN

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#### THE STEADY-STATE SIMULINK MODEL OF NUMERICAL MODELLING OF DC ELECTRICAL DRIVE USED IN NAVAL STEERING GEAR

**Abstract:** *The steering gear of a ship is an important system used for controlling speed and angle of a propeller. The purpose of the article is to present the speed regulation of DC motor (increase and decrease speed) used for the ship steering gear system.*

**Keywords:** *speed regulation; steering gear system*

**MITRUȚ CARAIVAN, PAUL BURLACU, VASILE DOBREF**

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**FURTHER DEVELOPMENTS OF MULTI-PURPOSE UNDERWATER DATA COLLECTION DEVICES  
DEPLOYED WITH REMOTELY OPERATED VEHICLES**

**Abstract:** This paper is following further development of the common framework model for multi-purpose underwater data collection devices focusing on second generation of simulation techniques VMAX2.0 on Perry-Slingsby ROV simulator. It is addressing physics-based simulation differences and their impact on the previous research for deployment challenges of underwater sensor networks called "Safe-Nets" by using Remotely Operated Vehicles (ROV) in the Black Sea area.

**Keywords:** Remotely Operated Vehicles, ROV, simulation, testing, object modelling, underwater component, oceanographic data collection, pollution, Black Sea.

**MITRUȚ CARAIVAN, VASILE DOBREF, PAUL BURLACU**

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**RESURFACING OLD DATA COMPRESSION & ENCRYPTION ALGORITHMS FOR EXTRA SECURITY  
SHELL**

**Abstract:** This paper presents a short history of data compression and encryption technologies starting with World War I and their possible value today by resurfacing old and forgotten algorithms as an increased security shell possibility for modern data files storage. It focuses on a case study using available internet tools as of 2016 and emphasizes on the results which relieve a blind eye over old and dusty data compression and encryption algorithms following data encapsulation, therefore showing the possibility of adding easily an extra security layer to any contemporary cutting-edge data protection method.

**Keywords:** data compression, archive, security, data protection, encryption algorithms.

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**CORROSION RATE OF STEELS DX51D AND S220GD IN DIFFERENT CORROSION ENVIRONMENT**

**Abstract:** Corrosion in the marine environment is an important issue because the costs caused by marine corrosion increased year upon year. It is necessary a correct approach to materials selection, protection and corrosion control to reduce this burden of wasted materials, wasted energy and wasted money. Many different types of corrosion attack can be observed to structures, ships and other equipment used in sea water service. Shipping containers are exposed to various corrosive mediums like as airborne salt, industrial pollutants, rain and saltwater. Transport damage during loading onto and unloading off trucks, train beds and ships breaches the paint coating which further contributes to corrosion. The result is shortened container life and high costs for container repair or replacement. The paper intends to evaluate, by gravimetric method, the corrosion rate and corrosion penetration rate of two types of carbon steel DX51D and S220GD. Carbon steel DX51D and hot-dip galvanized steel S220GD are used in marine and industrial applications for buildings cargo vessels, container ships and oil tankers. For testing it was used different corrosive environments: 5% NaOH solution; 5% HCL solution and 0.5M NaCl solution. The samples were immersed in 400mL of testing solution for exposure period of 28 days. Periodically at 3 days, 7 days, 14 days, 21 days and 28 days was measured de mass loss and evaluate the corrosion rate and corrosion stability coefficient. The steel DX51D was stable in 5% NaOH solution for 28 days, the values of corrosion stability coefficient was 7 after 3 days and 6 after 28 days of immersion in corrosive medium. In 5% HCL solution steels DX51D and S220GD was completely corroded in 21 days with a corrosion stability coefficient equal with 9 for 7 days and 8 for 21 days of immersion in corrosive solution. It was observed a good resistance for 3 days in 0.5M NaCl solution with a corrosion stability coefficient equal with 5, but after that stability of the steel decrease in time and corrosion stability coefficient increase at 6. For steel S220GD it was found a corrosion stability coefficient equal with 6 after 21 days of immersion and 5 after 28 days of immersion in 5% NaOH solution. In 0.5M NaCl solution the corrosion stability coefficient at steel S220GD was 6 for all period tested.

**Keywords:** DX51D carbon steel, S220GD hot-dip galvanized steel, corrosion environment, corrosion rate, corrosion stability coefficient

**DORU COSOFRET, MARIAN BUNEA, CATALIN POPA**

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**THE MANAGERIAL BENEFITS AND LIMITATIONS OF BIODIESEL USAGE IN MARITIME TRANSPORTATION**

**Abstract:** *The global economy development has not only positive effects but also negative consequences, in terms of air pollution with a major impact against the climate change and human health. This fact stimulated the intensification of research endeavours to identify and develop new options for sustainable energy supply and further for reducing the dependence on fossil fuels, as considered the major air pollutants globally. Among the non-polluting fuels, the currently biodiesel second generation becomes a viable solution in order to develop an alternative sustainable source of fueling. Even if this type of fuel has been implemented and approved as viable for land and air transportation meanings, the maritime transportation sector is still reluctant in implementing this new fuel on board to commercial vessels. In this article were approached the major advantages of using biodiesel powered engines, being detailed the technical, operational and legal solutions to eliminate the current reserve in adopting this innovative cleaner fuel on maritime transportation practice.*

**Keywords:** *Maritime transports, Biodiesel, Gas emissions, Sustainable transports.*

**DORU COSOFRET, MARIAN BUNEA, MARIAN RISTEA**

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**STUDY ON THE CARBON MONOXYDE AND HC EMISSIONS GENERATED BY THE DIRECT INJECTION DIESEL ENGINES, RUNNING WITH BIODIESEL**

**Abstract:** *Currently, the research results on the use of mixtures of biofuels with fossil fuels to power diesel engines are controversial in terms of reducing emissions of CO and HC which are contained in the exhaust gases of diesel engines. The diversity of the results is due to possibly different type of biodiesel used, the type of engine on which the tests were carried out and the methods and conditions for obtaining these results. Therefore, researches on regular diesel - biodiesel mixtures in various ratio is still a matter of study. In this regard, we conducted a laboratory study on a 4-stroke diesel engine, by using different mixtures (10, 15, 20, 25, 30, 40 and 50%) of diesel with biodiesel made from rapeseed oil. The study results reveals that the CO and HC emissions will decrease within creasing load. Also, the HC emissions and CO emissions when using mixtures of 10% and 15% are lower than the same emissions produced when the engine is powered with diesel.*

**Keywords:** *emissions, biodiesel, mixture, engine*

**ALINA – ELENA CREȚU**

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**ANALYSIS OF THE ACOUSTIC BEHAVIOR OF MULTILAYER PANELS WITH PERFORATED SHEET METAL FAÇADE ELEMENT AS COMPARED TO THE OUTSIDE NOISE**

**Abstract:** *This project is a study about covering both structural and economical requirements in order to enhance the utility and pleasure of a perforated metal façade. Optimizes the use of the elements of the multilayer panels and are part of the facade of many buildings, based on the criterion of sound absorption of these multilayer boards which use perforated sheet mainly for esthetic reasons and thermal.*

**Keywords:** *acoustics, SoundFlow, absorption coefficient.*

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**THE INFLUENCE OF FINISHING PARAMETERS OF ANTI-FRICTION LAYERS BY FINPLAST ON BEHAVIOR AT THE IMPACT**

**Abstract:** *FINPLAST is original proceedings propose for finishing antifriction surfaces of sledding bearings. FINPLAST is an original method proposed for anti-friction surface finish of the sliding bearings. The process extends cold plastic deformation technology, for finishing antifriction surfaces of the sliding bearings. In this paper presents the results of the evaluation of the state of stresses and strains obtained by simulation using the finite element method.*

**Key words:** *FINPLAST, finishing, antifriction, surfaces, cold plastic deformation.*

**FLORENȚIU DELIU, PETRICĂ POPOV, PAUL BURLACU, VASILE DOBREF**

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**IMPLEMENTATION PHOTOVOLTAIC PANELS IN LIGHTING SYSTEM OF A SHIP**

**Abstract:** *The possibility of using other sources of electricity than conventional one, on board vessels, is a highly actual subject. In this respect, this paper presents a simulation on the development of a proper photovoltaic panels configuration used for the lighting system of the ship, with 42kW installed average power.*

**Keywords:** *photovoltaic panels; lighting system*

**FLORENȚIU DELIU, VASILE DOBREF, PETRICĂ POPOV, PAUL BURLACU**

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**CHARACTERISTICS ANALYSIS, IN DYNAMIC CONDITIONS, FOR THE SHIP POWER OPERATING SYSTEM**

**Abstract:** *It was analyzed a naval power system which should ensure the power supply of different consumers. The systematic operations of marine energy systems are based on mathematical models describing the function of specific generators and consumers.*

**Keywords:** *electric power system, electric machines, mathematical equation, electric consumers.*

**VASILE DOBREF, PAUL BURLACU, PETRICĂ POPOV, FLORENȚIU DELIU, MITRUȚ C. CARAIVAN**

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**THE QUALITY FACTOR OF THE NAVAL M.H.D PROPULSION SYSTEM**

**Abstract:** *A naval propulsion magnetohydrodynamic (M.H.D.) induction is actually a linear induction machine that uses seawater as induced. In seawater occurs an interaction between a magnetic field induced by the progressive currents, resulting an electromagnetic force. This force causes the movement of water, which is discharged from the vessel through a nozzle, thus creating a reactive propellant. Such a propulsion system eliminates the propeller and its annexes reducing energy losses associated with the rotation of water, noise and cavitation.*

**Keywords:** *magnetohydrodynamic; propulsion system; magnetic force*

**VASILE DOBREF, FLORENȚIU DELIU, PAUL BURLACU, PETRICĂ POPOV, MITRUȚ C. CARAIVAN**

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**HIGH POWER APPLICATIONS OF ELECTROMAGNETIC DEVICES**

**Abstract:** *For the next generation, conventional weapon will touch the best performance limits and will become more and more what in what more an important part plans of improvement systems of weapon to the future. Physical laws that govern electromagnetic propulsion of guns, enabling them higher speeds than those of conventional arms projectiles. This is substantially benefit electromagnetic weapons - using electricity as energy for an electromagnetic weapons.*

**Keywords:** *electromagnetic weapons; rails, gun*

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**USING COTS COMPONENTS IN MILITARY COMMUNICATIONS SYSTEMS - TESTING AND EVALUATION**

**Abstract:** *The civilian/commercial market in the field of communications and information has nowadays a fulminate evolution. This evolution is based on satisfying the increasing need of a public that is already familiarised with the advantages of the modern technology.*

*The avalanche of the innovations released on the market created also the necessity for interoperability between different providers. This is mainly because the evolution tends to be unitary. Consequently, there emerged manufactures specialised in certain components that can be integrated in different personalised systems. Furthermore, the laws enforced in UE and not only imposed a series of standards helping the interoperability.*

*Those standards define certain technical performances for different products. These imposed performances together with the more performing modern technology made these commercial products (Commercial Of The Shelf – COTS) more and more attractive for the military, especially in the field of communications and information. This paper will present the possibilities of using COTS' products as part of complex military communications systems. Testing and evaluation of such components aims for maintaining the tactical and technical characteristics of the system while using commercial equipments.*

*As a case study, we will follow the use of small components as FPGA to larger systems as a Satellite. All those regarded through the process of testing and evaluation in order to obtain not only a fail resistant system but also a technical superior one.*

**Key words:** Informatics, Testing-and-evaluation, Communications, Space as critical infrastructure

**ION ADRIAN GIRBA, DORIN-SILVIU BANU, ANASTASE PRUIU, DANIEL MARASESCU**

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**ABOUT THE MAINTENANCE OF THE RADIAL AND AXIAL SHAFT BEARINGS FROM PROPULSION PLANT WITH GAS AND STEAM TURBINES**

**Abstract:** *The paper presents the main rules imposed by classification societies for design the shaft for propulsion plant with gas and steam turbines. It also analyzes the main maintenance activities to ensure their safe operation.*

**Key words:** turbine, bearing, maintenance, vibration.

**ION ADRIAN GIRBA, BEAZIT ALI, LEVENT ALI, ANASTASE PRUIU**

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**CYLINDER AND SYSTEM LUBRICATING OILS**

**Abstract:** *Increased thermal efficiency, savings in the fuel consumption and the possibility to burn low quality fuels conducted to an intense development of marine engines in past 20 years, this progress being emphasized by the increased combustion pressures and better combustion properties. These improvements represent a continuous challenge for lubricating oil manufacturers: the rise in combustion temperatures and pressures is making difficult to preserve the oil film in critical areas and the longer strokes of the piston leads to issues of spreading the oil. Adding here the new type of engines using gas or biofuel which requires different types of lubricating oils. Therefore, the success of new generation of engines will depend on lubricating oils quality.*

**Keywords:** antioxidant additives, lubricating oil, detergent, emulsification.

**NICOLAE JULA, ALEXANDRU SOFRONIA, TEODOR LUCIAN GRIGORIE**

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**AUTONOMOUS AERIAL SURVEILLANCE SYSTEM MOVEMENT MONITORING BY USING STRAP-DOWN INERTIAL TECHNIQUES**

**Abstract:** *The paper presents an inertial navigation algorithm used for an Unmanned Aerial Vehicle (UAV) boarding an optical detection system for the detection of the Corona discharge in high voltage power lines. The developed algorithm may be used both on real time positioning, but also in the debriefing process after the flight test, when the inflight acquired acceleration and angular speed data are processed together with the captured video streams, received by the Ground Mission Analysis System (GMAS). The integrated system was developed in a research project aiming the reduction of the losses in the transport of strategic interest utilities by using an advanced monitoring system based on IT&C infrastructure and autonomous aerial surveillance. In the paper are successively shown: 1) a short description of the research project; 2) the architecture of the strap-down inertial navigator and the associated mathematical model; 3) the software implementation of the navigator for the debriefing process, and 4) some positioning evaluation results based on the developed navigation algorithm.*

**Keywords:** autonomous aerial surveillance, flight test data analysis, strap-down inertial navigation, mathematical model, software implementation.

**DANIEL MARASESCU, MARIAN RISTEA, ADRIAN POPA, IONUT-CRISTIAN SCURTU, ANASTASE PRUIU**

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**CONSIDERATIONS REGARDING THE SHEAR STRESS DEVELOPED ON A 2000X100X4MM PLATE DURING THE IMPACT WITH A 6.2KG CYLINDRICAL BODY**

**Abstract:** *This article belongs to a series of papers which are covering a complex study regarding the impact of a 6.2kg cylindrical body on a 2000x1000x4mm plate using the software based on finite element theory.*

**Keywords:** shear stress, impact body, energy impact, distortion

**FLORIN MEDELEANU, CIPRIAN RACUCIU, DAN LAURENTIU GRECU**

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**DEVELOPING AND MODELING A NEW E-LOTTERY SYSTEM USING ANONYMOUS SIGNATURES**

**Abstract:** *In traditional lottery systems, the players choose some numbers on a ticket, enroll it to the lottery organizer and pay an amount of money for it. But this perspective offers no guarantee to the players that the lottery organizer doesn't manipulate the number selection in order to pay the least. This suspicion could be avoided if the lottery organizer didn't know the numbers selected by the players before the draw. Such a system is possible to be realized by using anonymous signatures, but the design should also guarantee that forging lottery tickets after the moment of the draw or claim of a different ticket is not possible. This paper will propose and analyze a model in order to fulfill all requirements described before, using several cryptographic primitives.*

**Keywords:** *e-lottery, anonymity, anonymous signing, encryption.*

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**CONSIDERATIONS REGARDING THE NORMAL STRESS (X AXIS) DEVELOPED ON A 2000X100X4MM PLATE DURING THE IMPACT WITH A 6.2KG CYLINDRICAL BODY**

**Abstract:** *This article belongs to a series of papers covering a complex study regarding the impact of a 6.2kg cylindrical body on a 2000x1000x4mm plate using the software based on finite element theory.*

**Keywords:** *normal stress, impact body, energy impact, distortion.*

**PETRICĂ POPOV, VASILE DOBREF, FLORENȚIU DELIU, PAUL BURLACU**

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**EFFECTS OF LOW FREQUENCY ELECTROMAGNETIC FIELD ON THE HUMAN BODY**

**Abstract:** International standardization institutions, which play an important role in assessing the effects of the field and determining the need to take protective measures for the human factor, developed safety standards on human exposure to electromagnetic field, differentiated for electric and magnetic fields of low frequency (near fields), as well as to electromagnetic radiation fields (far fields).

Until recently, many studies have shown that the main harmful effect on the human body was produced by high frequency electromagnetic field, but in recent years, more and more information also reveals that the serious damage can be caused by low frequency electric and magnetic fields. These low-frequency electromagnetic fields interact with human tissue causing harmful effects, the degree of destruction depending on factors such as: intensity, frequency, energy field level and duration of exposure.

**Keywords:** protective measures; near field

**PETRICĂ POPOV, PAUL BURLACU, VASILE DOBREF, FLORENȚIU DELIU**

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**DATA ACQUISITION AND ANALYSIS OF LOW FREQUENCY ELECTROMAGNETIC FIELD**

**Abstract:** In recent years more and more studies have shown that, the low frequency field strength (particularly magnetic, 50 / 60Hz) are a major risk factor; according to some specialists - even more important as the radiation field. As a result, the personnel serving equipment and facilities such as: electric generators, synchronous, the motors, the inverters or power transformers is subjected continually to intense fields, in their vicinity, with possible harmful effects in the long term by affecting metabolism cell, respectively, the biological mechanisms.

Therefore, finding new methods and tools for measurement and analysis of low frequency electromagnetic fields may lead to improved standards for exposure limits of the human body.

**Keywords:** power density; exposure limits; spectrum analyzer

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**VIBRATION ANALYSIS FOR DETECTION AND LOCALIZATION THE FAULTS OF ROTATING MACHINERY USING WAVELET TECHNIQUES**

**Abstract:** Vulnerable and critical mechanical systems are bearings and drive belts. Signal analysis of vibration highlights the changes in root mean square, the frequency spectrum (frequencies and amplitudes) in the time-frequency (Short Time Fourier Transform and Wavelet Transform), are the most used method for faults diagnosis and location of rotating machinery.

This article presents the results of an experimental study applied on a diagnostic platform of rotating machinery through three Wavelet methods: (Discrete Wavelet Transform -DWT, Continuous Wavelet Transform -CWT, Wavelet Packet Transform-WPT) with different mother wavelet.

Wavelet Transform is used to decompose the original signal into sub-frequency band signals in order to obtain multiple data series at different resolutions and to identify faults appearing in the complex rotation systems. This paper investigates the use of different mother wavelet functions for drive belts and bearing fault diagnosis. The results demonstrate the possibility of using different mother wavelets in rotary systems diagnosis detecting and locating in this way the faults in bearings and drive belts.

**Keywords:** bearings, drive belts, Discrete Wavelet Transform, Continuous Wavelet Transform, Wavelet Packet Transform, mother wavelets

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**EXPERIMENTAL INVESTIGATION FOR FAULT DIAGNOSIS BASED ON FFT AND WAVELET TRANSFORM**

**Abstract:** Belts are components of the mechanical systems of rotation commonly used for mechanical power transmission and changes in rotational speeds in the shafts. Various failures of the drive belts (foot shear, tooth wear, hollowed teeth, back cracks) are common in rotating machines and can cause economic

losses. To increase efficiency, reliability and safety of the machines the use of new fault diagnosis techniques of belts, identification and classification is required. In this paper Fast Fourier Transform (FFT) and Wavelet transform complementary methods are used for fault monitoring of drive belts, analyzing in this way the limitations and advantages of using these methods. Experimental investigations for the fault diagnosis of drive belts are made using experimental platform and Bruel & Kjaer equipment for measuring vibration and PULSE and MATLAB software for recorded signal processing. The results were analyzed and presented.

**Keywords:** fault diagnosis, drive belts, Fast Fourier Transform, Wavelet Transform.

#### **ANASASE PRUIU, BEAZIT ALI, ION-ADRIAN GIRBA, DANIEL MARASESCU**

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#### **ABOUT THE STUDY OF THE THERMAL STRESS FOR NAVAL SYSTEMS**

**Abstract:** In this paper are presented and analyzed the effects of thermal expansion on gas evacuation piping from naval power plants and technical protection possibilities to prevent structures from deformations; also are analyzed the possibilities for the use of thermal expansion for tightening the main screws for power plant propulsion.

**Keywords:** compensating pipe, linear temperature expansion coefficient, overall heat exchanger temperature, thermal stress.

#### **GHEORGHE SAMOILESCU, FLORENTIU DELIU, ADELINA BORDIANU, SERGHEI RADU**

“Mircea cel Batran” Naval Academy, Constanta, Romania // University “Politehnica” of Bucharest // Stena Crewing

#### **QUANTITATIVE ASSESSMENT OF THE EFFECTS OF ELECTROMAGNETIC FIELDS ON THE CREW OF A SHIP ACCORDING TO THE LEGISLATIVE NORMS**

**Abstract:** Because of the low emitting power of radio stations present on ships, for the specific range of emitting frequencies, parameters such as radiated power density and electric field intensities meet both European and American safety standards (EN 60215: 1989/A2: 1994 Safety Requirements for Radio Transmitting Equipment, En 50371 and FCC's Rule Parts 1. 1310, 2.1091 și 2.1093). The paper presents the limits of the field strength and power density for controlled and uncontrolled environments, for crew exposure, and the limits of field intensities and peak power density.

**Key words:** electromagnetic field, legislative rules, current density, specific absorption rate (SAR)

#### **GHEORGHE SAMOILESCU, FLORENTIU DELIU, ADELINA BORDIANU, SERGHEI RADU**

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#### **ELECTRIC AND MAGNETIC FIELD MEASUREMENTS FROM A SHIP FOUND IN THE PORT AREA**

**Abstract:** In order to conduct electromagnetic field measurements on board a ship four different locations have been used: the upper deck; the aft; the command point- exterior; the navigating bridge - inside. Within each location measurements were performed with different stations located in broadcasting, on different frequency ranges and operating modes (AM - amplitude modulation and FM - frequency modulation), depending on the available sensors. The measurements made on the ship targeted the following frequency ranges: 88-200 MHz, 200-2500 MHz. Measurements carried out on the vessel gaved data on: the electric field  $E$  [V / m], for different frequency ranges; the electric field [dB $\mu$ V / m]; rate exposure; ER:  $E^2/L^2$ ; field strength limit, L [V / m]; measurement error, ER \* 1000 [%]; electromagnetic power flux density, PD (or S) [ $\mu$ W / cm $^2$ ]; total field strength (RMS) [V / m]; maximum single [V / m].

**Key words:** electric field, magnetic field measurements, exposure rate, flux density

#### **GHEORGHE SAMOILESCU, FLORENTIU DELIU, ADELINA BORDIANU, ALINA BARBU**

“Mircea cel Batran” Naval Academy, Constanta, Romania // University “Politehnica” of Bucharest // Maritime University Constanta



### **ASSESSMENT OF THE IMPACT OF THE NATIONAL GRID AND OF THE MAINTENANCE PERIODS ON THE OPTIMIZATION OF THE WIND TURBINE OPERATION**

**Abstract:** *The upsurge in the value of wind energy in Romania may have occurred due to a constructive development of wind turbines, their dimensions and the increase in their number of units in wind farms. The modern design of large wind turbines, corroborated with an appropriate wind speed leads to a significant production of green energy. In order to obtain a greater amount of energy, modern turbines are fitted with many devices which are exploited by high-tech electronic circuits. Instruments of remote detection, measurement devices and control processes of the main measurement systems are based on various types of electronic apparatus. These appliances are very sensitive to tension variation caused by abnormal conditions of turbine operation and by the national electrical grid which the wind farm is connected to. The paper aims at providing an assessment of a wind farm registers as well as a set of methods meant to overcome such obstacles related to designing large wind turbines. Similarly, the paper offers a classification of the various types of abnormalities that appear in the installation connected to the electric grid, such as a sudden power cut, unplugging or tension variation. The difficulty of such an impact is to be determined for every type of disorder associated to electronic glitches occurring in wind turbines.*

**Key words:** *wind turbines, solar energy, electronic apparatus, electric grids*

### **DENIZ ÜNSALAN, K. TURGUT GÜRSEL, KUNSEL IZET-ÜNSALAN**

Institute of Marine Sciences and Technology, Dokuz Eylül University, İzmir, Turkey // Institute of Marine Sciences and Technology, Dokuz Eylül University, İzmir, Turkey // Faculty of Mechanical, Industrial and Maritime Engineering, Ovidius University, Constanta, Romania

### **A SYSTEM TO MAKE USE OF EXISTING BREAKWATERS AS OVERTOPPING WAVE ENERGY CONVERTERS**

**Abstract-** *The main purpose of building breakwaters is to produce safe havens for ships and boats in rough seas. The general architecture for a breakwater is a wall with a trapezoidal-shaped cross section extending parallel to the shoreline. As the waves from the open sea approach, they are encountered by the so-called slope and revetment of the breakwater, where the wave is broken and its energy is dissipated and/or reflected back. However, the ever-increasing attractiveness of the utilization of waves as energy sources, paralleling to the increasing monetary and environmental costs of energy, has led the authors to consider the vast amounts of this otherwise dissipated energy into useful electrical energy. A wave energy conversion concept, which can be classified as an “overtopping” wave energy converter was conceived, where the open sea-facing (revetment) side of the breakwater is fitted by a water collecting channel at a suitable height above the calm water level, running alongside the breakwater. The channel leads the collected water to a powerhouse containing a low head turbine (or a set of such turbines) discharging it to the calm water of the inner harbour. Power obtained from these turbines can be converted to electrical energy. In this study, an estimation of the volume of water collected by the channel and the energy production for a proposed breakwater - power station system for a typical rough weather shall be made.*

*It is deemed that the feasibility of this system is comparable to and even higher than the other wave energy conversion systems since it does not require additional facilities and power supply lines to be built due to its proximity to the existing energy transmission lines, except for the addition of new features/installations to the existing breakwaters.*

**Keywords:** *Wave energy, breakwater, run up height, wave overtopping converter.*

### **DOREL DUMITRU VELCEA**

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### **COMBUSTION STAGE NUMERICAL ANALYSIS OF A MARINE ENGINE**

**Abstract:** *The primary goal of engine design is to maximize each efficiency factor, in order to extract the most power from the least amount of fuel. In terms of fluid dynamics, the volumetric and combustion efficiency are dependent on the fluid dynamics in the engine manifolds and cylinders. Cold flow analysis involves modeling the airflow in the transient engine cycle without reactions. The goal is to capture the mixture formation process by accurately accounting for the interaction of moving geometry with the fluid dynamics of the induction process. The changing characteristics of the air flow jet that tumbles into the cylinder with swirl via intake valves and the exhaust jet through the exhaust valves as they open and close can be determined, along with the turbulence production from swirl and tumble due to compression and squish. The target of this paper was to show how, by using the reverse engineering techniques, one may replicate and simulate the functioning conditions and parameters of an existing marine engine. The departing information were rather scarce in terms of real processes taking place in the combustion stage, but at the*

*end we managed to have a full picture of the main parameters evolution during the combustion phase inside this existing marine engine.*

**Keywords:** *Combustion Simulation; Marine Engines; Finite Volume Analysis*

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**POLLUTANT EMISSION NUMERICAL ANALYSIS OF A MARINE ENGINE**

**Abstract:** *The energies produced by the diesel engines of strong power are largely used in marine propulsion because of their favorable reliability and their significant output. However, the increasingly constraining legislations, aimed at limiting the pollutant emissions from the exhaust gas produced by these engines, tend to call into question their supremacy. The analysis of the pollutant emissions and their reduction in the exhaust gas of the slow turbocharged marine diesel engine using ANSYS 15 constitutes the principal objective of this study. To address problems of global air pollution due to the pollutant emission from fuel oil engine combustion, it is necessary to understand the mechanisms by which pollutants are produced in combustion processes. In the present work, an experimental and numerical study is carried out on a unit of real use aboard a car ferry ship. A numerical model based on a detailed chemical kinetics scheme is used to calculate the emissions of NO<sub>x</sub>, SO<sub>x</sub> and Soot in an internal combustion engine model for the same characteristics of the real unit. The combustion process parameters based on the numerical model might now be optimized in order to decrease the pollutant emissions in order to meet the IMO regulations.*

**Keywords:** *Combustion Simulation; Marine Engines; Finite Volume Analysis, Pollutant Emissions*