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ABSTRACT
MECHANICAL AND ELECTRICAL SCIENCE

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HIGH-VOLTAGE MONITORING EQUIPMENT USING ACOUSTIC PROCESSING

Abstract: *In the last decades, naval propulsion has developed in the high-voltage domain. This domain is represented here by 3.3kV, 6,6kV and 11,5kV. The electrical energy is supplied using these voltages to lower the currents for a big power demand. These voltages used for propulsion and reefers have the advantage of being more efficient than the conventional low voltages.*
The monitoring of the equipment that produces high-voltage energy is done with thermo-vision cameras and insulation resistance measurement. Our project proposes a different monitoring using acoustic holography.
High-voltage equipment produce noise that can be identified using vibration and acoustic measurements. The high-voltage equipment onboard commercial ships emit noise from electromagnetic components in the medium at high frequency range. As noise sources, the power transformers, inductors, switchers etc. represent sources that can be investigated using acoustic holography and thus the noise produced by each of them can be determined. The noise from these components is in the 20Hz-20kHz frequency range, and sometimes over 20 kHz. Many of the noises produced by the equipment are in the audible domain and so they can be heard during functioning.
One of the advantages of this technique is that it is a non-invasive technique. It uses a microphone array that is placed around the equipment and thus the noise emitted by the equipment is mapped. The technique is similar to the intensimetry method, but here is measured the sound pressure level instead of sound intensity level. Thus, the results can be correlated rapidly with the noise limits from the standards that are expressed in terms of SPL (Sound Pressure Level).

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REAL SHOOTING TRAINING TARGET AUTOMATED WITH ARDUINO

Abstract: *The Word is facing with tremendous changes in the geopolitical relationship, which act like a cold war and put pressure on anybody, especially on military personnel. Also, there are new types of asymmetrical conflicts which includes terrorist acts. As the entire Word is changing and the threats are evolving, is necessary to improve the training facilities for military personnel. This paper propose a method to update a low caliber munition shooting training target using microprocessor's processing and vibration sensors. The main idea is to create a sophisticate training battle field for military personnel. All the target will have capabilities to act by them-self, or coordinated by the instructor. The paper present the automated part of the entire project. In order to achieve that we used a simple Arduino One board, a vibration sensor and a step-by-step electrical motor with its driver.*

Aurelia CHIOIBAS
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THE PROCESSING ELEMENTS BY DRAWING

Abstract: *This paper is an overview of the technological system of processing and factors that characterize the drawing, because the piece is the result of interactions between all of them.*

Aurelia CHIOIBAS
" Mircea cel Batran" Naval Academy, Constanta, Romania

THE INTERACTIONS BETWEEN DRAWING PROCESSING ELEMENTS AND THEIR INFLUENCE ON THE QUALITY PARTS

Abstract: *In this paper is present the influences between the components of technological drawing system and elements that make up the process drawing, which is reflected in the quality of parts obtained.*

Dumitru DASCALU
"Mircea cel Batran" Naval Academy, Constanta, Romania

CRYSTALLINE STRUCTURE AND FATIGUE PHENOMENON OBSERVATIONS

Abstract: *The actual work presents some observations regarding the generation of crystalline structure by crystalline germination and the way in which the structure decays at the crystals periphery. The structure at the crystals periphery generates an upper structure which definitely influences the properties of materials. This work analyses the way this upper structure influences the behavior of the materials crystalline structure subjected to fatigue.*

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EVALUATION OF DEFORMATION OF CONTACTS BETWEEN ROLLING BODIES AND THE WAYS OF ROLLING BEARINGS
Abstract: *The paper presents aspects of the relative movement of the cinematic ways of rolling bearings and rolling bodies, how to generate waves of global deformation response during contact between them. The paper presents the destructive effects of the wave of global deformation response over the quality of the surfaces of these components.*

Dumitru DELEANU
Constanta Maritime University, Romania
HE'S HAMILTONIAN APPROACH FOR THE GENERALIZED DUFFING CONSERVATIVE OSCILLATOR
Abstract: *The Duffing-like oscillators have been extensively applied to represent many physically systems especially in engineering sciences. Our paper is aimed to use the He's Hamiltonian approach (HA for short) for obtaining a simple analytical solution to the generalized Duffing conservative oscillator, where the restoring force is written as an odd polynomial of arbitrary degree.The HA provides also a fast and reliable estimation of frequency – amplitude relationship. Three illustrative particular cases, for which the closed-form solutions are available, are given to check the efectiveness of the HA and the accuracy of the obtained results. They correspond to the classic softening oscilator, to a simple pendulum mounted on a rotating rigid frame and to a cubic – septic Duffing oscillator, respectively. The analytial results are contrasted with their exact or numerical counterpartsand they reveal an excellent agreement for small amplitudes, acceptable discrepancies for medium amplitudes and high enough relative errors for large oscillation amplitudes, when the oscillator behaves unharmonically. For the simple case of the softening cubic oscillator, an improved approximation is derived too.*

Dumitru DELEANU
Constanta Maritime University, Romania
STUDYING A TWO-DIMENSIONAL NONLINEAR MODEL FOR GALLOPING OF ICED CONDUCTORS BY A MODIFIED VARIATIONAL ITERATION METHOD
Abstract: *Galloping is a self-excited aeroelastic oscillation of slender structures, such as high voltage overhead lines or tall buildings, characterized by large-amplitudes and low-frequencies. The movement of the excited structure develops commonly transverse to the wind but other translational or rotational motions have been observed on the field. In the paper, a two-dimensional weakly nonlinear model of an iced suspended cable, having as degrees-of-freedom the vertical plunge and the rotation around the elastic axis, is introduced. The sysem is excited by a uniform wind and susceptible to galloping. A modified variational iteration method is employed to obtain a system of four amplitude-frequency modulation equations, that yields both the transient and the steady-state behaviors. The influence of wind speed on the initiation of galloping as well as on the amplitude of oscillation is analyzed in far-from resonance conditions. The theoretical results derived in the paper have been applied to a typical section model and the numerical results are contrasted with those provided by the direct integration of equations of motion.*

Cătălin FAITAR, Iordan NOVAC
Constantza Maritime University, Romania
ASPECTS TO THE STUDY OF FLOW DYNAMICS AND CAVITATIONS ON DUCT – TYPE SHIP DEVICES
Abstract*: Contributions to the study of flow dynamics and cavitations on duct-type ship devices are engineering things studied today. Not only elements of the fluid mechanics, such as the fluid pressure, density, viscosity, speed and the hydrostatic equations are used for this study, but also the influence of the Reynolds and Mach numbers influencing the flow fluid are being studied. Some present studies regarding the current stage of the finite volumes method and nonlinear optimisation, including the mathematical foundations of numerical analysis of fluid dynamics best help for this. The CFX numerical analysis of models with and without wet duct and cavitation is being analysed by making a comparative study that includes the schemes mentioned above for speed, pressure and current lines.*

K. Turgut GÜRSEL, Mesut TANER, Deniz ÜNSALAN, Gökdeniz NEŞER, Erkin ALTUNSARAY, Mehmet ÖNAL
Dokuz Eylül University, Turkey
FORM DEVELOPMENT AND VALIDATION OF AN AUTONOMOUS UNDERWATER VEHICLE
Abstract: *Engineering projects such as surveys for oil and natural gas resources, offshore structures, undersea pipelines, harbours, etc., require geomorphological, geological and geophysical as well oceanographic research both at the coastal and offshore areas. Such research is conducted by research vessels or by small craft equipped for the specific purposes, which require extensive labourship. This method of research causes high costs and may also involve threats to occupational safety and property due to the harsh weather conditions at sea. Furthermore, high precision measurements cannot always be performed during such seismic research. Thus, autonomous underwater vehicles (AUV) have been developed intensively in the last two decades.*
The objective of this study is to find the proper unmanned underwater surveying vehicle to conduct research on the geomorphological, geological and geophysical aspects of the structure of the sea bottom and on the Earth's mantle

beneath the seas as well oceanographic opinions. Therefore, this article is aimed to provide a comprehensive understanding about computational fluid dynamics (CFD) analysis of a SWATH ship model and the validation of the results obtained in these analyses with those of the experiments of this ship model performed by Begovic et al, 2015. After successful conformity of the simulations carried out using the commercial software ANSYS/FLUENT, the developed models of an immature goose-beaked whale (ziphius cavirostris) and an immature sperm whale (physeter macrocephalus) as well three torpedo shaped AUV models with the same length of 6,0 m were analysed in the same manner and the results obtained were compared to each other.

Gheorghe lCHIMOAEl, Octavian TĂRĂBUŢĂ, Cătălin CLINCl, Beazit ALI
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CONSIDERATIONS ON THE SHIP'S HYDRODYNAMIC FIELD

Abstract: *In this paper we studied the possibility to compute ship's hydrodynamic field. The level of ship's hydrodynamic field is depending by ship's overall dimensions and speed. The hydrodynamic field values are important, because are used to determining the speed with which you can navigate safe in an area where depth and sensitivity mines are known.*

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Military Technical Academy, Bucharest, 'Mircea cel Bătrân' Naval Academy, Constantza, Romania

ELECTRICAL PROPULSION ANALYSIS FOR A PASSENGER SHIP

Abstract: *The electrical energy obtained onboard a ship is split up on the engine room on different electrical control panels. The main electrical control panels are usually divided into two, three or four sections, for a better operation of the ship. According to rules and regulations for electrical propulsion, an electrical control panel can take the unfavorable consequences in case of one section breaks down due to a fault. To avoid the usage of an expensive electrical installation, the electrical energy command system is to be split into three or four electrical control panels. In electrical propulsion regime, the electrical control panels are interconnected, resulting into a better flexibility for electrical energy generation mechanism configuration. Losing propulsion or energy maintaining station in one part of the system is going to have an impact on the remaining installations through the control system. The remaining electrical energy must maintain ship's maneuverability, stability and buoyancy. Therefore, we have analyzed the electrical propulsion components, the sequential control of propulsion engines and their limitations.*

Mihai BALACEANU, Ovidiu CRISTEA, Nicolae BADARA
Politehnica University, Bucharest, Romania, "Mircea cel Batran" Naval Academy, Constanta, Romania

LABVIEW SIMULATION OF A MATHEMATICAL MODEL FOR RAPID VARIATIONS OF AMBIENTAL CONDITIONS ON A PHOTOVOLTAIC CELL

Abstract: *This article presents a mathematical model used to anticipate the module temperature which is based on real parameters measurements of the photovoltaic ensemble such as: ambient temperature, wind velocity, wind direction and relative humidity. The adopted mathematical model is capable to generate the temperature of the photovoltaic model using only three of the input data.*
The results obtained after running the chosen mathematical model in the LabView simulation program shows that the cell generated current and power are proportionally rising with the wind velocity. Also, the variation of the output power produced by the photovoltaic cell between the extreme values of the wind velocity is 0.021W and also, the higher current is produced, as it was accepted, at the highest wind velocity.

Corneliu MOROIANU
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COMBUSTION BEHAVIOR OF FUEL WATER EMULSIONS USED IN NAVAL ENERGY SYSTEMS

Abstract: *Reducing of emissions from burning fossil fuels in marine power systems is a goal by virtue of which we use different methods. The paper presents numerical calculation of the combustion of the marine fuel RMF 25 executed by a program designed by using MathCAD mathematical interpreter. I was interested in the concentrations of CO, NO_x, SO_2 and CO_2 while decreasing the combustion temperature to its emulsification with various percentages of water.*

Corneliu MOROIANU
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THE DYNAMIC DESIGN OF THE MARIN ENGINES

Abstract: *The study of the stresses in the drive mechanism takes into account the determination of forces and moments loading the drive mechanism. Depending on the physical phenomenon inducing the forces in the drive mechanism, we have: pressure forces, inertia forces, friction forces and gravity forces. Practically speaking, the determination of the pressure and inertia forces presents a special importance and the other two forces are much smaller. This paper presents a numerical method for determining the stresses by means of the E-FORT program with MATHCAD as a mathematical interpreter.*

Musaab ZAROG
College of Engineering, Sultan Qaboos University, Oman

3C-SIC: APROMISING MATERIAL FOR GHZ RESONATORS IN OUT-OF-PLANE RESONANCE MODE

Abstract: *Cubic silicon carbide (3C-SiC) has excellent mechanical and electrical properties that make it very promising material/candidate to replace conventional silicon (Si), in many MEMS/NEMS applications including microresonators*

(e.g. microactuators and microsensors). Attaining high frequency resonators will widen the application of MEMS in signals filtering and mixing besides improving the accuracy of microsensorsers. This paper presents promising results of high resonance frequencies at the out-of-plane mode using 3C-SiC microstructures. The SiC microbridges were successfully actuated up to 2.4 MHz. The paper claims that highest out of plane resonance (of 2.4 GHz) can be achieved with reducing the same 3C-SiC resonator to nanoscale size and considering higher modes of actuation.

George NOVAC, Ionut-Cristian SCURTU, Tiberiu PAZARA
" Mircea cel Batran" Naval Academy, Constanta, Romania

SIMULATION OF MECHANICAL STRESS SUPPORTED BY MARINE DIESEL ENGINE'S FIXED PARTS

Abstract: *This paper studies the stresses occuring in large fixed parts of marine diesel engine because of thermal processes from inside the combustion chamber.The MAN B&W K80 MC-C engine is aimed, an engine still widely used in the world fleet of merchant ships, and stresses values are obtained through dedicated computer simulator software.*

Adrian POPA, Ionut-Cristian SCURTU, Beazit ALI, George NOVAC
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MESHING AND 3D MODELLING FOR SHIP CONSTRUCTION ELEMENTS

Abstract: *All construction elements are subjected to immense forces during ship operation. The presented study is made using different mesh for high stress area on the transverse element presented. The paper presents static loading analysis for the transverse beam model based on Ansys software results.*

Adrian POPA, Ionut-Cristian SCURTU, Beazit ALI, George NOVAC
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DATA SOLUTION FOR TURBINE SAFETY

Abstract*: Many efforts have been made in turbine safety regarding static and dynamic loads. Taking into account that turbines operate in various range of speeds and support a wide spectrum of engines, we will consider for Ansys analysis a simplified turbine model. The paper presents modal analysis for the turbine model based on Ansys software results.*

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ASPECTS REGARDING THE DIMENSIONING OF ELECTRICAL INSTALLATIONS USING POWER ENGINEERING SOFTWARE

Abstract: *On T22 frigates, the quality of the oil used in gearboxes is provided by centrifugal separators. In the operation cycle of those separators, it is necessary to preheat the oil in limited conditions of temperature and flow. Currently, the preheating process is designed to be carried out by air preheaters.*
The paper shows the technical solution in order to replace air preheating with electrical heating. Also it provides a comparison between the direct computation results with the Power Analytics' DesignBase Software calculations done for the studied case.

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TEST OF THE DETECTION CAPABILITIES OF A SIDE SCANNING SONAR MOUNTED ON AN AUV

Abstract: *Autonomous underwater vehicle (AUV) a.k.a. underwater drones are subsea vehicles which operate in the underwater environment independently of direct human input. There is a growing interest in underwater data collection by using autonomous underwater vehicles within the oceanographic research community. In this paper, the Iver 2 AUV is examined to accomplish accurate side-scan data while executing well planned missions. Therefore, this papers goal is to collect and process underwater data using the Iver2 AUV configured by the Research Center for Navy and built by Ocean Server during the underwater and surface missions.*

Mihaela TUROF
Constanta Maritime University, Romania

WE CAN INTRODUCE THE NOTION OF OPTIMAL DESIGN IN RATES OF MACHINE?

Abstract: *Optimization is a process to decide on the best solution of two or more possible. In the field of machine optimization process consists of establishing a algorithms (design method) in which starts at tasks (force and moments exterior) that loads the song, select a group of materials that might be used (for that known resistance characteristics) and add restrictions (which limits certain solutions or use of certain materials). In addition, consider a function of purpose that must be maximized or minimized (for example: minimal use of materials, minimal cost price, high efficiency, durability, etc.). With this set of data, restrictions and functions of purpose creates a "operational model" that leads to "optimal solution" - optimized proper purpose.*

Deniz UNSALAN, Kunsel IZET-UNSALAN, K. Turgut GURSEL
Dokuz Eylul University, Turkey, Ovidius University of Constanta, Romania

A WAVE ENERGY CONVERSION SCHEME BASED ON ROLL PARAMETRIC EXCITATION OF A FIVE-HULLED TRIMARAN BARGE

Abstract: *As a method of obtaining power from the gravity waves that are abundant in seas, a "point-absorber" type wave energy extraction device, based on nonlinear Hill/Mathieu equation has been conceived. A special barge type device, having five hulls symmetrical both with respect to the centerline and to the waterline, and moored in a position to receive waves from the beam and thus forced to roll is the basis of this approach. At small angles of roll, the barge can be analyzed as a wall-sided hull. However, above a certain angle of roll, the hull shall become a trimaran, causing the moment of inertia and the metacentric radius and metacentric height increase rapidly. This shall induce a quadratic term to the righting arm term of the uncoupled equation of roll. Since the roll equation is periodic, by the analysis that shall be outlined in the following paper, the roll equation is a form of the Mathieu equation, causing a parametric roll phenomenon between two extreme angles. The energy of the waves as transferred to the rolling motion can be extracted by a pendulous mechanism that can be used to get electrical energy to be transmitted ashore by cables. The energy extracted shall be accounted as a term of the damping term of the equation of roll.*

The concept is examined by the numerical solution of the roll equation. An estimate of power from a typical wave at the same order of the barge's dimensions is made.