

## ABSTRACT

### MECHANICAL AND ELECTRICAL SCIENCE

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

Naval Academy, Constanta, Military Technical Academy, Bucharest

#### **RESEARCHES UPON THE CAVITATION PHENOMENON OF THE CENTRIFUGAL PUMPS**

**Abstract:** *The main problem of the hydrodynamics of cavitation implosion of a single bubble, consists in pressure and velocity fields determination, including the collapse velocity of the bubble wall. The bubble surface is a discontinuity surface, and the overpressure produced by a bubble collapse are very great (many thousands bar) facts that suggests the opportunity of the distribution theory use. We use from in distribution of the equations for a non viscous, incompressible liquid. Using the Dirac filtering property some integral equations were obtained, giving the liquid velocity and pressure fields due to the bubble's implosion. By analysis the theoretic and experimental phenomenon it establish the implicit function which describes this phenomenon. By application the  $\Pi$  theorem for this implicit function it finds the criterion equation of phenomenon. Depending on operating condition various cavitation patterns can be observed on a body surface as travelling bubbles, attached sheet cavitation, shear cavitation or vortex cavitation. Leading edge attached partial cavitation is commonly encountered on rotor blades or on hydrofoil. It corresponds to the case for which a vapor cavity is attached in the vicinity of the leading edge and extends over a fraction of the foil surface. It generally takes places at incidence angles for which a leading edge pressure peak occurs and reduced below the liquid vapor pressure. At the early phases of development, leading edge partial cavitation is steady.*

**PAUL BURLACU, MIRCEA TARHOACA**

Naval Academy, Constanta

#### **AN OPTIMAL CONTROLLER DESIGN FOR AN AUTONOMOUS UNDERWATER VEHICLE MODEL**

**Abstract:** *This study designs a controller that are used in an AUV for depth and direction changing system. This design is based on the linearized model of the underwater vehicle.*

**AURELIA CHIOIBAS**

Naval Academy, Constanta

#### **ASPECTS OF OBTAINING COMPOSITE MATERIALS**

**Abstract:** *The fiberglass reinforced plastics are characterized through an excellent ratio strength/weight, a good heat insulating and the sound-proofing at ship's side, the fireproof ness, the fatigue endurance limit, the resistance to shock, the water degradation resistance. Those features suggest for the shipbuilding in the military zone and civil.*

**DORU COSOFRET, MARIAN BUNEA, FLORIN NICOLAE, MARIAN RISTEA**

Naval Academy, Constanta, Military Technical Academy, Bucharest

#### **TECHNICAL AND OPERATIONAL MANAGEMENT SOLUTIONS TO REDUCING THE MARITIME TRANSPORT ASSOCIATED EMISSIONS**

**Abstract:** *The maritime transport is a vital component of the logistic and supply chain worldwide and a crucial sector for the EU economy. Although the maritime transport could be less pollutant than other transport means, the fuel oil dependancy and the strong public community position for reducing not only the CO<sub>2</sub> emissions, but also other pollutants emissions (SO<sub>x</sub>, NO<sub>x</sub>, e.a.) are representing serious reasons for considering this industry as one of the most pollutant worldwide. This article is proposing an indepth view of the actual used technical and operational solutions which are available in the industry in order to reduce the emissions level onboard. Also there are presented the trends for increasing the energy efficiency onboard, by considering the cost – efficiency indicators and also the social and operational results inside the maritime transport companies.*

**FLORENȚIU DELIU, PETRICĂ POPOV**

Naval Academy, Constanta

#### **EXPLOITATION OF RENEWABLE ENERGY SOURCES IN THE ROMANIAN ENERGY STRATEGY CONTEXT**

**Abstract:** *This paper conducts an analysis based on the current market situation of energy in the framework of liberalization and the need for providing energy security, in compliance with national and international standards for environmental protection. There are presented, by category, the types of renewable energy*

sources and their present situation in Romania. Also, are presented the particularities of renewable energy use in the low power electricity production and their integration in distribution networks.

**VASILE DOBREF, PETRICA POPOV, SILVESTRU GROZEANU**

Naval Academy, Constanta

**THEORETICAL STUDY ON THE DEPENDENCE OF THE ELECTROMAGNETIC FIELD PENETRATION DEPTH IN SEAWATER, WITH THE SALTS CONCENTRATION**

**Abstract:** Whereas the induced of an electrical machine is the element in which electromagnetic field energy is converted into useful mechanical energy, it becomes extremely important to analyze its properties. The issue of the liquid induced is not treated in all its aspects in the literature, therefore in this paper were highlighted aspects that the authors consider to be important for naval propulsion engines, having seawater as induced. Mechanical and electrical behavior of liquids depends very much on their nature, but also on many other factors, such as temperature, pressure, concentration of dissolved substances, etc. In the case of electrical machine with the solid induced (metal), electrical and mechanical properties of the induced remains almost unchanged as long as it is not replaced with another. For electrical machines with liquid induced, electrical and mechanical properties of the induced are dependent on many factors that may change during machine operation. The electrical conductivity, the most important parameter that determines the functioning of the electrical machine, depends strongly on the temperature and other factors. Whether for melted metals, conductivity depends only on temperature, in the case of an electrical machine which uses an electrolyte solution as induced, the whole phenomenology becomes more complex due to the strong dependence of the conductivity with temperature, and the concentration of dissolved substances.

**DAN FOSTEA, ALEXANDRU BARBU, ȘTEFAN ARSENI, LIDIA BOIANGIU**

Military Equipment and Technologies Research Agency

**TESTING STATE OF THE ART RADIO COMMUNICATIONS EQUIPMENTS WITH REGARD TO THE LEGACY SYSTEMS USED IN TACTICAL ENVIRONMENT**

**Abstract:** The requirements for tactical communications systems have become, in recent years, more diverse and more demanding in terms of performance. Following this idea, a modern tactical communications system must be based on the IP technology for effortless integration with information systems, must provide sufficient bandwidth, in order to support a wide range of services, and must operate continuously even if the environmental and operational conditions become more and more unsuitable, things characteristic for the tactical environment.

The solutions adopted by the armed forces worldwide in order to achieve fast and reliable communications include high capacity multiband radio stations and radio relay equipments. The integration with the legacy communications systems, mainly based on E1 and D1 Eurocom technologies, is a must, especially if there is a strict budget to consider.

In this paper we present an analysis of several types of equipments and technologies used in the military tactical radio networks infrastructure along with different field test results. The analysis highlights the specific advantages and disadvantages of some equipments and it is based on test results obtained by communication equipments representative for current military market. The tests were performed under ideal conditions, in order to identify the maximum performances of the equipments and to establish a benchmark, and under tactical environment or real working conditions, in order to identify the weaknesses and the strengths of each equipment especially while operating integrated in a complex system.

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

Military Technical Academy, Bucharest, Naval Academy, Constanta

**CONSIDERATIONS ABOUT SHIP CLASSIFICATION SOCIETIES RULES FOR INSTALLATION ON BOARD OF NAVAL PROPULSION SYSTEMS WITH GAS TURBINES**

**Abstract:** The work has been done on the study of bibliography and experience in the operation of the doctoral students in the field of gas turbine power plants. The paper highlighted that rules of ship classification societies concerning of the arrangement of gas turbine propulsion plants to ships, and a brief overview of the role of ship classification societies.

**DANIEL MARASESCU, CRISTIAN IONUT SCURTU, MARIAN RISTEA, ADRIAN POPA, FLORIAN VASILE**

Naval Academy, Constanta, Military Technical Academy, Bucharest, Romania

**STUDY OF ENVIRONMENTAL INFLUENCES ON THE FUNCTIONAL PARAMETERS OF THE COOLING SYSTEMS**

**Abstract:** Advances in Computational fluid dynamics and actual simulation possibilities are the best way to present the thermal and fluid dynamics inside the cooling systems. Onboard all ships, coolers are available

and are the common way to cool engines, pumps and all systems. The numerical investigation based on Ansys software will present data for different environmental parameters inside cooling systems. Also heat from the cooling systems is a source of free energy and shipbuilders are strongly ask for inexpensive energy solutions.

#### **CORNELIU MOROIANU**

Naval Academy, Constanta, Romania

#### **THE COMBUSTION OSCILLOGRAMS OF WATHER-HEAVY FUEL OIL EMULSION DROPLET**

**Abstract:** The vaporization and combustion characteristics of a marine heavy oil-water emulsion droplet are investigated with graphological method. The combustion graphology of fuel oils is defined as a new technical and scientific field which deals with the graphic transposition of the processes of fuels combustion development in a simulator. Thus, it is easy to establish the ignition-combustion characteristics, including the laws that govern their changes depending on the combustion conditions and fuel specifications.

#### **ADRIAN POPA, DRAGOS NEAGU, MARIAN RISTEA, MIRCEA PAVEL**

Naval Academy, Constanta, Romania, S.C. Marine and Offshore Consultants S.R.L., Constanta, Romania

#### **CONSIDERATIONS ABOUT USING A SECONDARY REVERSE CHUTE DURING A CABLE LAY PROCEDURE**

**Abstract:** During cable laying operations, there are situations when cable loose contact with the chute. This situation is unacceptable since the cable control is lost. To avoid this situation, in a real cable laying operation it was used a reversed chute. In this paper is presented the adopted solution and the calculus behind it. All the data on that paper are protected by the copyright laws and belongs to S.C. Marine and Offshore Consultants S.R.L. <http://marineoffshoreconsultants.com/>

#### **EMIL PRICOP**

Automatic Control, Computer & Electronic Engineering Department Petroleum-Gas University of Ploiesti

#### **SECURITY OF INDUSTRIAL CONTROL SYSTEMS – AN EMERGING ISSUE IN ROMANIA NATIONAL DEFENSE**

**Abstract:** Romania, a NATO country since 2004, is situated at the Eastern NATO borders, having a geostrategic position at Black Sea and near Ukraine, a very sensitive area due to its vicinity and influence of Russia. Romanian energy production and distribution systems along with industrial plants are critical infrastructures for the country energetic independence, an important factor of national defense. Each power plant, petrochemical facility or refinery is operated by various interconnected control systems. In this paper the author tries to address the critical industrial control system protection against cyber-threats (cyberterrorism, cyberwar, hackers, etc.). The state of the art in identifying vulnerabilities and securing control systems is presented in the first part of the paper. Based on the analysis of the identified vulnerabilities the author tries to provide a comprehensive guideline for increasing the security of those critical infrastructures without affecting their performances and functionality.

#### **MARIAN RISTEA, ADRIAN POPA, ALEXANDRU COTORCEA**

Naval Academy, Constanta, Romania

#### **RANSE SIMULATION FOR A TWO DOF SHIP MODEL**

**Abstract:** The article shows the results of a CFD study of a PANAMAX tanker which was considered to be placed in head waves, restrained until two degrees of freedom, which corresponds to free heave and pitch motion. The simulation considers several operational draft values. A RANSE (Reynolds Averaged Navier Stokes Equations) solver using finite-volume discretization and free-surface capturing approach is employed for the computation.

#### **MARIAN RISTEA, ADRIAN POPA, DRAGOS IONUT NEAGU**

Naval Academy, Constanta, S.C. Marine and Offshore Consultants S.R.L., Constanta, Romania

#### **CFD MODELLING OF A 5 BLADED PROPELLER BY USING THE RANSE APPROACH**

**Abstract:** Computational fluid dynamics (CFD) represents a branch of fluid mechanics that uses algorithms, numerical methods and computers in order to simulate various processes associated to flow conditions. In this manner, the flow developed in naval propellers is simulated by using a number of conservation equations together with several additional equations, models for turbulence, pressure, cavitation, heat exchange and chemical species transport or dispersed phases equations.

#### **MARIAN RISTEA, ADRIAN POPA, DRAGOS NEAGU, MIRCEA PAVEL**

Naval Academy, Constanta, Marine & Offshore Consultants S.R.L.

#### **COMPARATIVE ANALYSIS ON A CLB STATION KEEPING IN REGULAR AND IRREGULAR WAVES**

**Abstract:** *The offshore industry gained a great development level in the past years, due to the necessity of sustainable and clean energy. This trend is determined by the new development and installation of more and more offshore wind farms. In the great effort of commissioning an offshore wind farm, one of the players will always be Cable Laying Vessels / Barges, which are required to lay submarine high voltage cables in the nearshore area. In order to prove the capabilities of the envisaged barge to lay the cable in the required conditions, there are carried several engineering studies, which are aiming the hull behavior in the most unfavorable conditions. One of the most important studies is represented by the station keeping studies. The article is aiming to present a comparative analysis between two simulation scenarios, by considering regular and irregular wave train.*

**GHEORGHE SAMOILESCU, SERGHEI RADU, ADELINA BORDIANU**

Naval Academy, Constanta, Stena Crewing, Polytechnic University of Bucharest

**OPTIMIZATION OF MARINE POWER SYSTEMS**

**Abstract:** *Automated integrated systems assures supervision and command of a machine, of navigation integrated systems and loading, unloading and observation of the load. Automated systems for machines and mechanisms are used for signalization and indication, for controlling the propulsion installations, for distribution and energy command depending of the role on ship (essential and nonessential), etc. The running of electric sources needs the use of automated voltage regulation, automated synchronized schemes and distribution of load. Automated systems for navigation are used for autopilots, for supervising of hull stress, for active roll stabilizers, for anti-collision system and route, etc. Specific for naval integrated automation systems is the use of two computers – one for operation and one for standby – the two of them operating in tandem. Given the optimum level of optimization of a ship, it depends on many factors, from which the most important are the ones related to economic efficiency. Safety and reliability increase in installation operating, aggregates and measuring and control equipment, real time processing of large volumes of information required making programs. In order to achieve an optimization of electrical systems and energy consumption onboard a ship we made a program with the help of: Microsoft Visual Studio C# 2010 Express Edition for the assembly of data; MathCAD for numerical calculation and Microsoft Excel collect experimental data and plotting graphs representing some practical results.*