

## **COATINGS FOR CORROSION PROTECTIONS OF STEEL CARBON OBTAINED THROUGH IMPULSE ELECTRICAL DISCHARGES**

MIHAELA BARHALESCU<sup>1</sup>, CONSTANTIN DUMITRACHE<sup>2</sup>

<sup>1</sup> *Constantza Maritime University, barhalescum@yahoo.com*

<sup>2</sup> *Constantza Maritime University, ldumitr@yahoo.com*

The work entitled "Coatings for corrosion protections of steel carbon obtained through impulse electrical discharges" presents the research done by the authors in regards with obtaining some superficial metallic layers, on parts made of carbon steel OL 37 brand, with the help of some electrodes from a corrosion resistant material (Cu). The corrosion resistance of the experimental attained layers was obtained with the polarization curves method. The superficial layers subjected to electrochemical corrosion were analyzed through optical metallographic microscopy, using the computers QX3 Intel Play microscope. The investigations made reflected an improvement of the superficial layers quality in regard to thermodynamics corrosion probability.

## **SOME APPLICATIONS OF NANODIMENSIONAL FUNCTIONAL LAYERS IN SHIP ELECTRONICS**

BOHOS APRAHAMIAN

*Nikola Vaptsarov Naval Academy,  
Varna, Bulgaria, e-mail: bohos@abv.bg*

Nanostructured materials have a number of desirable thermal, electromagnetic and mechanical properties and can play a significant role in improving key parameters of the ship electronic equipment.

Our recent work consist the obtaining of resistive elements, formed upon electroinsulated plates of alumina ceramics with nanodimensional conductive layers. Different layer compositions are experimented and the change of the electrical resistance due to the temperature rate is studied. The elements are applied as sensors in electronic bridge circuit for positive temperature measuring.

In recent years, nanoscaled magnetic materials have received much attention too, due to the fundamental interest in the unique magnetic property different from that in the bulk phase and to their promising applications in technology such as in the high-density magnetic storage. The magnetic properties are usually dictated by the size, dimension, shape, structure, morphology of the constituent phases, along with the type and strength of magnetic coupling between them. The magnetic metals, including Fe, Co, Ni, and their related alloys in low dimensional form, are one of the most important subjects to study.

Nanostructured materials can improve key antenna parameters like radiation-efficiency, directivity and mechanical robustness. Electromagnetic absorption properties can be controlled by changing the particle size distribution in nano-materials and application-specific, tailored materials can be produced.

## **AN APPLICATION OF NEURAL NETWORKS IN AUTOMATIC TARGET RECOGNITION AT SEA**

CHAVDAR ALEXANDROV<sup>1</sup>, CHRISTO PANCHEV<sup>2</sup>

<sup>1</sup> *N. Vaptsarov Naval Academy, Varna, Bulgaria, email: chavdar.alexandrov@gmail.com*

<sup>2</sup> *University of Sunderland, Sunderland, UK, email: christo.panchev@sunderland.ac.uk*

An approach to sea target recognition is examined in this paper. The automatic recognition of the target of observation is considered as detection of its tonnage class, approximate size and resulting maneuvering abilities. A neural network method is used to solve this problem. A number of experiments on real targets are described. Possibilities for application of Automatic Target Recognition (ATR) in sea navigation are proposed based on these experimental findings.

## **APPROXIMATE SOLUTIONS TO AN APPROPRIATE MODEL EQUATION FOR FINITE-AMPLITUDE WAVES ON SHALLOW WATER SURFACES**

DELEANU DUMITRU

*Constanta Maritime University, dumitrudeleanu@yahoo.com*

Nonlinear phenomena play a crucial role in applied mathematics and physics. The results of solving nonlinear equations can guide us to know the described process deeply. Because it is difficult to obtain the exact solution for these problems, we can use one of the standard methods for solving nonlinear differential equations. In this paper, we apply the variational iteration method (VIM) for finding approximate solutions of the Korteweg-de Vries (KdV) equation, which describes the propagation of finite-amplitude waves in shallow water surfaces. The obtained solutions are compared with exact solution. The results are in good agreement, especially for higher iterations.

## **FACULTY MOTIVATION AND THE ROLE OF SOCIAL CAPITAL IN HIGHER EDUCATION**

DIMITAR KANEV

Nikola Vaptsarov Naval Academy, Varna, Bulgaria  
9026 Varna, Bulgaria  
Phone: ++ 359-52-552266; Fax: ++ 359-52-303163  
E-mail: [kanev@abv.bg](mailto:kanev@abv.bg).

BOYAN MEDNIKAROV

Nikola Vaptsarov Naval Academy, Varna, Bulgaria  
9026 Varna, Bulgaria  
Phone: ++ 359-52-552223; Fax: ++ 359-52-303163  
E-mail: [bobmednikarov@abv.bg](mailto:bobmednikarov@abv.bg)

The objective of this paper is to investigate the incentive structure of higher education and the role of social capital in it. In the beginning are proven the limited capabilities of the market mechanisms to stimulate the creation of high quality educational outcomes. After that are revealed the benefits from reciprocal relations in higher education institutions and development of a system of altruistic moral norms, which turn universities into communities centered on the cooperation, tolerance and solidarity values. Next the paper considers the role of social capital for increasing educational revenues and decreasing the transaction costs and personnel expenditures. Finally the question of social capital accumulation sources is analyzed. The latter are sought in the choice of the social enterprise as an organizational form and adopting those management structures that stimulate freedom and equality among the members of higher education institutions.

## **DISTORTIONAL SIMULATION IN THE STUDY OF FLOW THROUGH CIRCULAR CONDUITS**

DUMITRU DINU<sup>1</sup>, MONICA STOIAN<sup>2</sup>

<sup>1</sup> *Constanta Maritime University, [dinud@imc.ro](mailto:dinud@imc.ro)*

<sup>2</sup> *Constanta Maritime University, [monisto@yahoo.com](mailto:monisto@yahoo.com)*

In the paper we propose to use the FLUENT program to make a comparison between the results of application normal similitude and distortional similitude in the experiments regarding flow through circular conduits. First, we established the model law, taking into account the physical magnitudes which influence the analyzed phenomena. Afterwards we calculated the scales of these physical magnitudes for normal similitude (one geometrical scale) and distortional similitude (two geometrical scales). Using FLUENT we determined the values of the velocity in the conduit axis, putting the pressure parameters and the dimensions of the conduit according to the two cases of similitude. Finally, we compared the "experimental" results with theoretical results, calculated by application of scale of physical magnitudes.

## **THERMAL STRESS-RELIEF PROCESS - NUMERICAL COMPUTATIONAL MODEL**

CONSTANTIN DUMITRACHE<sup>1</sup>, ADRIAN SABĂU<sup>2</sup>,  
MIHAELA BĂRHĂLESCU<sup>3</sup>

<sup>1</sup> *Universitatea Maritimă, Constanța, [ldumitr@yahoo.com](mailto:ldumitr@yahoo.com)*

<sup>2</sup> *Universitatea Maritimă, Constanța, [ady\\_sabau@yahoo.com](mailto:ady_sabau@yahoo.com)*

<sup>3</sup> *Universitatea Maritimă, Constanța, [mihaelabarhalescu@yahoo.com](mailto:mihaelabarhalescu@yahoo.com)*

In the article [3] the authors propose a mathematical model of optimization thermal stress-relief process which are conditioned by the plastic yield speed phenomenon. These actual models take in advance experimental results but don't reflect another practical phenomenon, the plastic yield speed is increasing in the vicinity of material yield point. In this paper is computed using numerical method Runge-Kutta [1] the time variation law  $\sigma(t)$  of thermal residual stresses at OLC45 steel.

## **THE SUBMARINE CONTROL SIMULATOR "VALNA – K" – FEATURE DEVELOPMENT AND IMPROVEMENT DIRECTIONS**

KANCHO KANEV, EVGENI MILANOV, STEFAN ATANASOV

Naval Academy – Varna, e-mail: [kanev@construmat.bg](mailto:kanev@construmat.bg)

Bulgarian Ship Hidrodinamic Centre – Varna, e-mail: [e.milanov@bshc.bg](mailto:e.milanov@bshc.bg)

Naval Academy – Varna, e-mail: [steafan@yahoo.com](mailto:steafan@yahoo.com)

The use of simulators is a lasting trend in the process of training and maintaining the skills and habits of the crews of naval vessels. The contemporary computer technologies allow great possibilities for the development of simulators with a high degree of representation of processes and physical objects (maneuvering ships, other processes in real time, ship systems, devices and complexes) [1], [2].

The Republic of Bulgaria has the design experience as well as the scientific and research units with well-proven achievements in the computer simulation and the development of maritime simulators. One of them is the "Valna-k" submarine control simulator.

# **ENVIRONMENTAL, SOCIAL AND ECONOMIC ANALYSIS OF THE BIOGAS USE IN SPARK – IGNITION ENGINES**

FEIZA MEMET

*Constanta Maritime University, feizamemet@yahoo.com*

The biogas resulted from manure can be utilized in internal combustion engines in order to produce energy and to improve farms energy balance, in the framework of environmental pollution reduction. This issue has also a socioeconomic aspect because the discharging of rejects in the environment led to important concerns all over the world. The economic analysis should identify the best solution to burn the biogas flow in internal combustion engines, that is why are needed all incomes and expenses of the cogeneration plant.

## **AN APPROACH TO THE DEVELOPMENT OF VIRTUAL DGPS NETWORKS**

MIROSLAV J. TSVETKOV<sup>1</sup>, KOSTA I. IVANOV<sup>2</sup>

<sup>1</sup> *N. Vaptsarov Naval Academy, Varna, Bulgaria, e-mail: tsvetkov.m@gmail.com*

<sup>2</sup> *N. Vaptsarov Naval Academy, Varna, Bulgaria, e-mail: ki\_ivanov@abv.bg*

This paper represents an approach for developing of a virtual reference systems network (Virtual DGPS Network) for the needs of the maritime navigation. The current status of DGPS coverage over the Mediterranean – Black Sea region is analyzed. The use of the data generated by the suggested model increases considerably the accuracy of GPS measurements, thus satisfying the requirements of the International Maritime Organization (IMO) and the requirements of the US Department of Defense and US Department of Transportation “2001 Federal Radionavigation Systems” (FRS).

## **MODERN ASPECTS OF MODELLING THE DYNAMIC BEHAVIOR OF HYDRAULIC POSITIVE DISPLACEMENT UNITS AND SYSTEMS PART I. GENERAL MODELLING APPROACH**

PEICHO TOMOV

*Department of Ship Power Plants by N. Y. Vaptsarov Naval Academy, email [tomovpd@yahoo.com](mailto:tomovpd@yahoo.com)*

This report reviews in general results obtained by the author during his long scientific research experience in the field of hydraulic power drive systems and control systems with marine application. With modelling the static and dynamic of the operational processes, the thermal effects are observed by taking into account the working liquid condition. The non-isothermal approach is proved to be of great importance for the proper exploitation and maintenance of the system and its elements. The author submits a patent-protected hydraulic unit, which is experimentally examined and provides a theoretical base for the implementation of frequency controlled hydraulic drives. This kind of hydraulic drives is modern and perspective alternative of the classic hydraulic drives, which incorporate a variable displacement units.

# **MODERN ASPECTS OF MODELLING THE DYNAMIC BEHAVIOR OF HYDRAULIC POSITIVE DISPLACEMENT UNITS AND SYSTEMS PART II. SERVO-DRIVE AND FREQUENCY CONTROL**

PEICHO TOMOV

*Department of Ship Power Plants by N. Y. Vaptsarov Naval Academy, email  
[tomovpd@yahoo.com](mailto:tomovpd@yahoo.com)*

This report reviews in general results obtained by the author during his long scientific research experience in the field of hydraulic power drive systems and control systems with marine application. With modelling the static and dynamic of the operational processes, the thermal effects are observed by taking into account the working liquid condition. The non-isothermal approach is proved to be of great importance for the proper exploitation and maintenance of the system and its elements. The author submits a patent-protected hydraulic unit, which is experimentally examined and provides a theoretical base for the implementation of frequency controlled hydraulic drives. This kind of hydraulic drives is modern and perspective alternative of the classic hydraulic drives, which incorporate a variable displacement units.

## **MULTINATIONAL CREWS AND THEIR POSSIBLE INFLUENCE ON INCIDENTS WHICH ATTEMPT AGAINST ENVIRONMENT IN PORT**

RICARDO RODRÍGUEZ-MARTOS DAUER, JOAN MARTÍN MALLOFRE, RICARDO  
GONZÁLEZ BLANCO,  
*DEPARTAMENT OF NAUTICAL SCIENCES AND ENGINEERING, POLITECHNICAL  
UNIVERSITY OF CATALUNYA  
[rrodriguez@cen.upc.edu](mailto:rrodriguez@cen.upc.edu)*

In the last decades the number of multinational crews on board ships is increasing. It is a phenomenon that is closely related to Flags of Convenience and the employment of eventual crews of the 3<sup>rd</sup> World countries, through manning agencies.

The problems regarding the join of different languages and cultures, and the questions about professional qualifications, induce us to presume that vessels with multinational crews are expected to suffer more incidents that can damage the environment, that others.

In order to carry out with this investigation, it was made an analyse about the flags of the ships entered in Barcelona, Tarragona and Valencia in the last 3 years, to know the percentages of Spanish, foreign and convenience flags.

The second step was to get a list of the incidents happened in those ports in the period between 1994 and 1999. From it we have try to establish a relation between risk of incidents and composition of crews.

The third step was to collect opinions of ship agents.

This paper cannot be used as determinant, but it let us take some first conclusions in order to warn the maritime community about the importance of composition of crews for safety and environment protection.

# PROPOSAL OF INDICATORS OF SUSTAINABILITY IN THE SECTOR OF THE MARITIME TRANSPORT

SANTIAGO ORDÁS<sup>1</sup>, JORDI MESSEGUER<sup>2</sup>

<sup>1</sup> *Universidad Politécnica de Catalunya, [sordas@fnb.upc.edu](mailto:sordas@fnb.upc.edu)*

<sup>2</sup> *Universidad Politécnica de Catalunya, [jmesseguer87@hotmail.com](mailto:jmesseguer87@hotmail.com)*

It is necessary to establish a system of indicators of the sustainable development in the maritime transport that allow to value the evolution of this sector for the ambience of the sustainability. The indicators have to reflect the triple dimension of the sustainable development: economic, social and environmental. These indicators of sustainability are hardware of evaluation that they help to construct a society with tuning with the environment. The following paper presents a series of indicators and his expression of calculation for the concrete case of the maritime transport. Some of these proposed indicators use the concept of unit of load of the ship, and in our case the concept of TEU is used, but there might be used the value of tons of load of the ship.