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## THE NUMERICAL ANALYSIS OF STRESS DISTRIBUTION BASED ON HYDROELASTICITY THEORY FOR A TANKER TEST SHIP HULL

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**Abstract.** In this paper there is presented the numerical analysis for the stress distribution at a tanker test ship hull, based on the linear and non-linear hydroelasticity theory. The test ship is a tanker with simplified structure and length 240 m. There are considered two significant load cases: full and ballast. The analysis has been carried on in the frame of Romanian Academy GAR-Project [12] (sections 3,5,7), using eigen program code DYN [10]. The numerical results pointed out that the non-linear analysis can reveal the extreme wave loads in the ship hull structure.

*Keywords*: Hydroelasticity, Non-linear numerical analysis, Wave loads, Springing, Slamming, Whipping.

## ANALYSIS OF EXHAUST AND STACK SYSTEMS OF A WARSHIP

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**Abstract**. Unlike the commercial vessels, diesel and gas turbine engines are frequently utilized in warships, even both, CODOG (Combined Diesel or Gas Turbine Engine System). In this study, a warship diesel exhaust system with CODOG propulsion is analyzed analytically and then compared with the numerical results obtained by a CFD code of FLUENT. The pressure losses due to a lot of number of parameters such as friction, bending, etc. are calculated with respect to the design rules document given for warship exhaust systems. The flow analysis of system is performed in 2-D model with full scale and velocity vectors, pressure and temperature fields are obtained through simulation. In the analysis, the diesel exhaust system with two-inlet pipes and one outlet is considered. The pressures at inlets and outlet are calculated via CFD code of FLUENT and results are compared with analytical calculations and proved that the total pressure loss is within the maximum pressure limit permitted by diesel engine manufacturer.

*Keywords:* diesel and gas turbine engines, warship diesel exhaust system, 2-D model

## WASTES AND POLLUTANT SOURCES RESULTED FROM SHIPBUILDING INDUSTRY IN TURKEY

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**Abstract**. This paper focuses on shipyard processes and associated multimedia pollutant emissions (e.g., solid, liquid and air) resulting from shipbuilding and ship repair activities. Ship building industry known to be one of the oldest productive facilities of mankind is a major source of pollutants to the environment mentioned above. Almost all of the applications in a shipyard cause to pollution, because both the raw materials used for construction of a vessel and the waste produced are potential pollutants. Shipyards are often categorized into two basic subdivisions: Shipbuilding and ship repairing. In general, wastes produced during shipbuilding and ship repair may be summarized as follows: organic components that may gasify remainders of any kind, solvent, oil and resin, waste water, waste of paint and abrasive products. In this work some ship building and ship repair applications such as cutting, surface preparation, painting and welding are examined and their harmful consequences to the environment in terms of both the raw materials and the waste products are evaluated.

*Keywords*: Shipyard Wastes, Pollutant Sources, Shipbuilding Industry.

## CONCEPTUAL DESIGN OF A DEVICE FOR ENERGY FROM LOW HEAD HYDRAULIC SOURCES

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**Abstract**. Ever growing interest for energy recovery from natural (renewable) sources has led engineers to investigate means of energy recovery from the abundant low head water flows, such as sea currents or rivers. Most of the existing low head flow energy devices rely on obtaining energy by the creation of lift on turbine blades, and their efficiency is limited by the so-called Betz efficiency and the efficiency of Gorban et al. However, this work proposes a device that relies on the drag formation and it is shown that the ideal efficiency is higher than that of lift-dependent machines. The basis of the proposed device is a series of paddles (scoop plates) located around the periphery of an endless belt, mounted on a catamaran or trimaran barge, and only the paddles in the lower part of the barge are immersed to water and are dragged by the current. After leaving the water, paddles are carried back to the bow part of the barge on the upper part of the endless belt. It is shown that the efficiency of energy conversion from the stream can theoretically rise up to 0.963.

*Keywords*: Renewable sources of energy, paddles, catamaran or trimaran barge.

## ANALYSIS OF THE MECHANICAL BEHAVIOR OF A PRESSURE TANK

RUSU-CASANDRA Aurelia, ILIESCU Nicolae, SOROHAN Ştefan, *Polytechnic University of Bucharest, Department of Materials Strength, Bucharest, 060042, Romania*

**Abstract**. This paper presents an analysis of stresses and deformations in the shell of a pressure tank and its supports bolted in the foundation. Two cases of loading were considered: first with constant internal pressure, second, the pressure tank was filled with liquid. In both cases the weight of the structure was also taken into account.
The study was performed using an analytical method and a numerical method, the latter employing the finite element method (FEM). In addition, for a proper design of the supports, a modal analysis of the pressure tank was carried out.

*Keywords*: Pressure tank, stress and strain analysis, finite element method, natural frequencies, mode shapes.

## CAPITAL MARKET EVOLUTION OF CONSTANTZA PORT HANDLING AND STORAGE COMPANIES

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**Abstract.** The Romanian capital market is still an emergent one. However, there are six issuers in the transportation, handling and storage industry listed on the first and second tiers of Romanian Stock Exchange or on the OTC market (Rasdaq). Among them, three companies act in Constantza Port – OIL Terminal (OIL), Comvex (CMVX) and SOCEP (SOCP). The paper investigates the historical evolution of their market prices, identifying the expected rate of return and the components of the shares risk (specific and systematic risk). Some tests regarding the shares return rate distribution and also the Fama test for the informational efficiency are done. The market price model is taken into consideration for prices forecasting. The results are subject of interpretation considering additional managerial and financial information of the companies activity.

*Keywords*: Capital market, shares return rate, risks, market price model, market efficiency.

## ON BENDING OF CIRCULAR PLATES WITH RADIAL STIFFENERS

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**Abstract**. This paper presents some aspects regarding the behavior of circular plates with radial stiffeners subjected to axial symmetrical loads. The experimental, numerical and analytical results of the plates with radial stiffeners are presented. The analytical results correspond to those obtained using the finite element method and determined with experimental method.

*Keywords*: circular plate, radial stiffeners, stress, strain, displacement, finite element.

## THEORETICAL AND EXPERIMENTAL RESEARCHES CONCERNING THE STATIC AND THE DYNAMIC TESTING OF THE ELASTIC AND SAFETY CLUTCHES

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**Abstract**. The paper presents the determination of the theoretical and experimental characteristics for the elastic and safety clutches with flat followers. In this way, it can be studied the dynamic behavior of the elastic and safety clutches in the working process (complete connected work situation, uncoupling process and coupling process) and consequently the clutch geometry can be optimized. The dynamic study proposed by this paper, it is also useful for the analysis of the representative influences of the geometrical and functional parameters on the dynamic behavior of the clutch.

*Keywords*: Mechanical Transmission, Clutches, Elastic, Safety, Functions, Simple, Multiple.

## MODERN DESIGN OPTIMIZATION TOOLS

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**Abstract**. The integration of optimization techniques with Topology Optimization Techniques and Finite Element Analysis (FEA) and CAD is having pronounced effects on the product design process. Modern optimization methods perform shape optimizations on components generated within a choice of CAD packages. A possible peril of design optimization is that its accuracy, and thus success, hinges on assumptions and approximations remaining valid for all of the FEA analyses. A topology optimization example is provided and is reveled the status of most used optimization techniques and analyses the principle behind design optimization strategies using CAD geometry situation - the design optimization of mechanical parts or assemblies.
A concluding discussion is driven about how some of the perils can be avoided if nonlinear FEA or event simulators are used in place of the standard linear analysis.

*Keywords*: Computer Aided Design, Design Topology Optimization, Finite Element Analysis, Associativity, constraints

## STRUCTURAL BEHAVIOR EVALUATION OF THE PISTON COMPRESSOR CON-ROD BASED ON DYNAMIC STRESS SIMULATION

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**Abstract.** In this paper, we attempt to evaluate the structural behavior of the piston compressor con-rod (stress and displacement magnitude values) based on dynamic stress simulation, for two situations: 1. The con-rod length is constant, the compressor speed is increased from idle speed to nominal speed; 2. For a constant compressor speed (nominal speed), the con-rod length has the different values. The analyses were made using specific module of the MSC software – MSC Visual Nastran Desktop 4D.

*Keywords*: finite elements, stress, strain, optimization, rigidity, virtual prototyping

## NUMERICAL MODELING AND SIMULATION OF THE FLUID FLOW ACTION ON ROTOR BLADES OF THE MICRO-HYDROPOWER STATION

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**Abstract.** Micro-hydropower station provides an efficient conversion of kinetic energy of river water into mechanical or electrical energy without building barrages. Increased efficiency is provided by the optimum position of the blades with aerodynamic profile. The formulation used to compute the hydrodynamic forces is an inviscid –boundary layer model. Currently, micro-hydropower station is in the execution phase and it will be installed on Prut river in Stoienesti village, Cantemir district, R. Moldova

*Keywords*: micro-hydropower station, blade, aerodynamic profile

## STUDY ON THE STEEL/POLYCARBONATE CONTACT IN CONDITIONS OF FRICTION FOR VARIOUS FORMS OF CONTACTING ELEMENTS APPLIED TO PROCESSIONAL GEARING

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**Abstract.** Fabrication of kinematical precessional transmissions toothed wheels by plastic mass molding ensures increased qualitative parameters and low cost. The peculiarity of precessional transmission pinion sphere-spatial motion enforces carrying out new investigations on the study of losses at friction in the gearing. In this work an experimental study on the steel/polycarbonate contact for various kinetostatic parameters and plastic materials is presented.

*Keywords*: Precessional transmission, friction coefficient, slipping

## SOME RESEARCHES CONCERNING THE SUSCEPTIBILITY TO CYCLIC LOADING OF SOME TI BASE ALLOYS

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**Abstract.** In this work we have studied the susceptibility to cyclic loading of the titanium base alloy (4,7% Mo, 1,1% Cr, 1,3% Fe, 5,1% V, 5,4% Al, Ti rest) and the microstructure influence on kinetic propagation of the fatigue crack. The samples with square section of 160 mm were heat treated following three different regimes. As a result we have obtained various structure types and different levels of ultimate tensile strength and elongation values. We can confirms the fact that the optimal ultimate tensile strength for the studied by us titanium alloys, for cyclic loading status, can be considered between 1100 – 1200 MPa.

*Keywords*: titanium alloy, cyclic loading, microstructure, elongation, ultimate tensile strength

## CHEMICAL SYNTHESIS OF CERAMIC NANOPOWDERS

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**Abstract**. The classical ceramic routes based on the solid state reactions at high temperature have many disadvantages due to the large diffusion distances. New chemical methods such as hydrolyze, sol-gel process, hydro-chemical synthesis or process in gaseous phase have been developed to synthesize ceramic nanopowders. This paper represents a review of the new chemical process for elaboration of nanopowders.

*Keywords*: nanopowders, chemical synthesis, ceramics.

## RESEARCHES REGARDING THE HEAT TREATMENT OF CASTING ALUMINUM ALLOYS IN VIBRATORY FIELD

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**Abstract**. Within the researches were studied the influences of the mechanical vibrations to artificial ageing of some aluminum alloys. There were studied 6 types of alloys Al-Si-Cu, with different copper content, between 1 and 6 %. These are submitted to a hardening process in water and heat oil and then to an artificial ageing at 170°C. During the ageing, the samples were supplementary submitted to energy from outside, under a mechanical shutter vibration. It has been notified that the mechanical shutter vibrations superimposed to the thermal field has influence to the kinetics of the transformation, in the way of acceleration of the process. Similarly, it were observed some changing to the structure and the hardening tests were bigger with 15…20 % in comparison with the classic procedure.

In the paper is given also the influence of copper content above to the properties of thermal treated alloys.

*Keywords*: aluminum alloys, heat treatments, mechanical vibrations

## STUDIES CONCERNING THE INFLUENCE OF THE THERMO-MECHANICAL TREATMENTS OVER THE TENACITY OF THE STEEL WELDING JOINT 10TINICR180

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**Abstract.** In the paper are presented the experimental studies concerning the use of the cryogenic steel 10TiNiCr180 in making the bulks for the stock of the liquid nitrogen. Because of the tenacity's importance obtained at the exploitation temperature (-196°C) two welding tests have been made (a manual metal arc welding tests – MMA and a metal inert gas welding test – MIG) which be examinee under a thermo-mechanical treatment with heat distortion. Appling of this treatment has as effect obtained of a better resilience at low temperature, with the diminution of the transitional temperature from ductile fracture to brittleness fracture.

*Keywords*: cryogenic steel, heat distortion, tenacity.

## USING SLICING TO ACHIEVE QUALITY SOFTWARE TESTING

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**Abstract.** Maintaining large and complex software systems is quite difficult, as these systems support a big number of modifications. Software maintainers are faced with the task of regression testing: retesting these software systems after a modification. The goal of regression testing is to ensure that bug fixes and new functionality do not adversely affect the correct functionality inherited from the original program. Regression testing can be expensive in terms of both human and machine time. Many approaches for reducing the cost of regression testing have been proposed in the literature. Program slicing is a decomposition technique which extracts programs elements related to a particular computation. With a slicing process, we can locate within the source code the elements that use common data items. In the paper is made a brief description of those testing approaches that make use of program slicing and is presented our tool that can be used for software testing, and that is based on the graph theory and the program slicing technique.

*Keywords*: Program slicing, software testing, regressing testing.

## BAYESIAN MAINTENANCE POLICIES DURING A WARRANTY PERIOD

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Abstract. Most of the brand new items are released on the market with a certain type of warranty. A fixed length warranty period is assumed in this paper. A maintenance policy which consists of minimal repair and preventive maintenance is analyzed for the case of known and unknown failure parameters of the item's lifetime distribution.

*Keywords*: warranty, maintenance, Bayesian analysis

## ANALYSIS MODEL OF THE MATERIAL FLOW IN THE ADAPTIVE SYSTEM OF PRODUCTION PLANNING (ASPP)

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**Abstract.** The material flow analysis at the level of system of production planning leads to a mixed problem of programming the production tasks and of allocating the necessary resources. The formal representation of the materials flow render the adaptively dynamic evolution of the materials flow from the raw material to the of output finite product and with heuristically modeled constitutes the basic premise of the Adaptive System of Production Planning. This paper presents an analysis model of the materials flow which relies on the formal representation of the materials flow and which introduces elements of certain novelty such as: formal representation of material flow, Technological Network of Flow Materials, matrix flow, flow leaves, allocating degree of the flow level and others.

*Keywords*: Adaptive Systems Production Planning, Technological Network a Flow Materials, matrix flow.

## AN ALGORITHM FOR TEMPLATE MATCHING

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**Abstract.** In the paper we propose an algorithm for searching and localizing a given template in an image. This algorithm works with proper description of the template and of the corresponding window from the image. These descriptions are based on the geometric characteristics and on the intensity features of the compared objects. The measure of similarity is compound and includes all of the compared parameters. The fast dissimilarity principle is applied in order to accelerate searching process. Every following description of the object will be made only if the previous compared features (parameters)

are enough closer each other. The main goal is to find and localize scaled and rotated templates and more of that – to determine the scale factor and the angel of rotation.

*Keywords*: Template matching, feature extraction, object localizing.

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## NEW GENETIC OPERATORS FOR MUTATION AND SELECTION IN GENETIC ALGORITHMS

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**Abstract.** In this paper we present an approach to the optimization of genetic algorithms using innovative genetic operators. The objective is to explore the high grade of achievements made in the matter of improving the performance and efficiency and decreasing the execution time of a simple genetic algorithm. The implementation has been based on well known genetic operators – selection and mutation. These have been expanded to form brand new schemes named random walk selection and adaptive threshold mutation respectively. Each of them has separately proved its efficiency when it comes to optimizing the applied genetic algorithm for solving NP hard problems. Random walk selection turns out to be a real success in genetic programming with its ability to produce best results for time considered amazing for the problems concerned, e.g. timetabling. Adaptive threshold mutation is a scheme that is hard to please but when it is, it contributes most to the optimization of the algorithm. A working program has been developed and successfully used for examining the parameters being a subject of optimization. Necessary comparisons and conclusions have been drawn.

*Keywords*: genetic algorithm, selection, mutation, performance, optimization.