



Секция „Машинознание, машинна механика, транспорт“ FIELDS “Machine Engineering, Machine Mechanics, Transport”

1

KINETOSTATIC MODEL OF GAS DISTRIBUTION MECHANISM FROM AN INTERNAL COMBUSTION ENGINE

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Abstract

In the present study, a kinetostatic model of a gas distribution mechanism (GRM) of an internal combustion engine (ICE) was built. The model is implemented for the valve closing phase in the MATLAB software environment. The dependences for sizing the elastic element on the force closure of the contour pairs in the mechanism are derived.

Keywords: *gas distribution mechanism, internal combustion engine, cam mechanism, kinetostatic model, inertial load, elastic constant, initial strain.*

2

KINEMATIC STUDY OF A GEAR MECHANISM WITH MUTUALLY ENGAGED SATELLITES

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Abstract

In the present work, a kinematic study of a gear mechanism with mutually engaged satellites has been carried out. The transmission ratios of the possible kinematic combinations of the mechanism were determined in order to compare the magnitudes of the transmitted torques. A parametric model of the mechanism is built in the SolidWorks environment. A methodology for obtaining the involute profile of gear teeth is proposed.

Keywords: *epicyclical gear, planetary gear, differential gear, satellites, angular velocity, gear ratio, involute profile, CAD systems.*





INVESTIGATION OF FRACTURE PROCESSES IN OPEN-PORE ALSI10MG MATERIALS REINFORCED WITH SiC AND Al_2O_3 VIA DIGITAL IMAGE CORRELATION TECHNIQUE

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Abstract

The influence of SiC and Al_2O_3 reinforcement on mechanical properties of open-cell AlSi10Mg-based composites in this study has been investigated. Materials were obtained by replication technique with pore sizes in a range of $800 \div 1000 \mu m$ and $1000 \div 1200 \mu m$. Mechanical properties under quasi-static compression loadings of alloyed and unalloyed AlSi10Mg foams were determined. Tests were carried out at two compression strain rates $10^{-3} s^{-1}$ and $10^{-2} s^{-1}$ after ISO 13314:2011 standard with parallel application of Digital Image Correlation technique in order to obtain more detailed information on deformation fields in tested specimens. The effect of the pore size and strain rate on fracture mechanism of observed porous materials was investigated. It was determined that reinforcement with either SiC or Al_2O_3 leads to better compressive properties compared to unalloyed AlSi10Mg skeleton.

Keywords: open-pore AlSi10Mg-based metal matrix materials; SiC and Al_2O_3 reinforcement, Digital image correlation, deformation fields, compression strength and fracture characteristics

3

EXPERIMENTAL INVESTIGATION OF THE CORRELATION OF THE OCCURRING VIBRATIONS IN THE ELASTIC SUSPENSION OF INTERNAL COMBUSTION ENGINE

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Abstract

It is known that a number of mechanisms, nodes and aggregates performing rotational, translational and reciprocating movements create vibrations with a wide range of parameters. Vibration measurement and analysis are an integral part of routine control and preventive diagnostics activities for both rotary and reciprocating machines. In the present work, an experimental study of the interrelationship of vibrations in the elastic suspension of an internal combustion engine (ICE) has been carried out. The object of the study is a three-cylinder gasoline engine. Statistical methods were used to process the





experimental data. The presented approach and the obtained experimental results provide an opportunity to build an algorithm for determining the current technical condition of the engine's elastic supports.

Keywords: *Vibrations, Preventive control, Diagnostics, Internal combustion engine, Technical condition*

4

ALGORITHM FOR DYNAMIC CONTROL OF THE TRANSPORT FLOW WHEN TRANSITING A COMPLEX CROSSROAD

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Abstract:

In this work, an algorithm for dynamic control of traffic flows in a complex intersection is proposed. A preliminary study was carried out on the intensity of transport flows. The obtained results for the intensity are decisive for the logical dependencies realizing the dynamic control. The proposed control algorithm is the basis for implementing a software solution in this traffic light system.

Keywords: *automobile, algorithms, transport flow, crossroad*

Секция „Механика на флуидите, топло- и масопренасяне“ FIELDS “Fluid Mechanics, Heat and Mass Transfer”

1

INVESTIGATION OF THE TRANSVERSE VELOCITY AND TRANSVERSE DISPLACEMENT OF A SOLID PARTICLE IN A HORIZONTAL BOUNDARY LAYER WITH LONGITUDINAL VELOCITY PULSATIONS

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Abstract

The article examines the movement of a single solid particle in the boundary layer of a flat horizontal flow with a fixed velocity, with longitudinal velocity pulsations, under the action of forces implementing the so-called inertial transport.

Keywords: *solid particle; boundary layer; horizontal flat current with longitudinal velocity pulsations; mass and surface forces.*



2

INCREASING THE ENERGY EFFICIENCY IN WATER DISTILLATION THROUGH THE USE OF A HEAT PUMP INSTALLATION

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Abstract

This paper proposes a practical scheme for an energy-efficient water distillation technology. The development refers to the efficient production of distilled water under vacuum, through the use of a heat pump installation. The publication describes the system and analyses its capabilities. A mathematical model describing the processes of heat and mass transfer is presented, which allows the heat balance of the installation to be drawn up. The ability to determine rational operating parameters of the distillation system will allow achieving maximum energy savings in water desalination processes. The proposed experimental arrangement is the basis for further research and physical modelling of heat exchange processes. It can be used as a prototype for creating industrial water desalination plants using heat pumps.

Keywords: energy efficiency, water distillation, heat pump installation

3

SEQUENCE IN SIMULATION MODELING OF BURNING PROCESS AT GAS FUEL COMBUSTION

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Abstract

Given the complexity of the heat and mass exchange processes in the stoichiometry of the combustion process, the use of numerical simulation has been proven to be a fairly successful approach in the research and development of new fuel technologies. Conducting experiments with model simulations is very convenient, because it is incomparably cheaper and safer, and very often the only possibility. In the present work,



the results of a computer simulation of a combustion process, with separate supply of the fuel and the oxidizer in the conditions of a straight jet, are considered. The model simulation for the considered fuel process was performed with the "Ansys/CFX" software product. The ANSYS software package has the ability to develop various simulation models of physic-chemical processes. The CFX product, which is fully autonomous, presents the advantages of modelling and the possibilities of achieving optimal results in combustion processes by changing the geometric, initial, boundary conditions in an experimental program environment. Experimental simulation modelling is also an effective way to teach students of heat engineering specialties, giving the opportunity to consider the diversity and specificity of combustion processes under different conditions, which enriches their knowledge and improves the quality of the educational process.

Keywords: CFX modeling, numerical simulation, burning process, gas fuel.

4

POSSIBILITIES FOR USAGE A COMPOSITE TORCH DERIVED FROM GAS INJECTION BURNERS

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Abstract

The management of combustion processes is a topic of permanent relevance. In addition to the economic and ecological factor in combustion processes, increasing the quality of technological processes is also of practical interest. The heating process in gas furnaces can be controlled by means of combustion devices. By changing the design and mode parameters of the combustion device, it is possible to influence the temperature fields in the furnace space. Such effects can have an impact on the geometry and hence on the properties of the resulting gas flare.

Keywords: Composite torch , injection burner, torch geometry.

5

ENERGY AND ECOLOGICAL ANALYSIS OF DRINKING WATER LOSSES IN THE REPUBLIC OF BULGARIA

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Abstract

The loss of water from Water and Sanitation Companies in the Republic of Bulgaria is a very serious both environmental and energy problem. Environmental changes lead to more and more difficulties for the provision of drinking water not only in Bulgaria, but also throughout the world. In this aspect, the drinking water losses generated by the





companies in the state amounting to more than 50% are extremely high. In this publication, a statistical analysis is carried out regarding the losses of drinking water in the last 3 years in Bulgaria, on the basis of which a calculation is also made for the energy losses. In conclusion, basic guidelines for limiting these losses are given.

Keywords: Energy, ecology, loses, drinking water.

6

RISK ASSESSMENT OF FIRE IN BUILDINGS

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Abstract

Fires that occur in buildings are one of the serious problems in Bulgaria. The article analyzes the number of fires by regional directorates for the period 20120-2022 based on statistical data. An analysis was made of both the number of fires and the reasons that caused them..

Keywords: fire, analysis, statistical data

7

ANALYSIS OF FLOODS BASED ON THE RELIEF OF BULGARIA

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Abstract

Floods are second most dangerous disaster in the Republic of Bulgaria. It social and economic consequences can have a significant adverse effect on the development of the country and its economic growth, therefore disaster risk reduction is very important for sustainable development. The paper presents a descriptive analysis of floods in Bulgaria for the time period 2010 – 2021. The survey is based on the relief of Bulgaria. Existing statistical data is reviewed and analysed and, as consequence, recommendations are proposed.

Keywords: flood, analysis, statistical data

8

LABORATORY TESTING OF A HYDRAULIC MOTOR OPERATING WITH CYCLIC LOADING

Martin Pushkarov

Abstract

Testing and parametrizing a hydraulic motor in a laboratory environment is necessary because the motor operates for approximately 500 hours with a cyclic load. Recording





all its parameters during operation will show if and how its parameters set by the manufacturer change. The conducted tests determine the conditions for the correct operation of the hydraulic motor in normal mode, as well as in the mode of operation under cyclic loading (loading/unloading). An algorithm was used to study the reliability and service life of the hydraulic motor under the operating conditions thus tested.

Keywords: Lab study, hydraulic motor, hydraulic system, hydraulic flowmeter

9

UTILIZATION OF WAVE ENERGY WITH TURBINE WITH OSCILATING BLADES

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Abstract

The energy from ocean waves is the most conspicuous form of ocean energy, possibly because of the, often spectacular, wave destructive effects. The waves are produced by wind action and therefore, are an indirect form of solar energy. In the presented study is given the investigation of the efficiency of the energy transformation of sea waves in mechanical energy through a type of a hybrid system with an air turbine and an water turbine with oscillating blades.

Keywords: wave energy, utilization, turbine

Секция „Електротехника, автоматика и информационни технологии“ FIELDS “Electrical Engineering, Automation and Information Technology”

1

ON THE IMPULSIVE GENE REGULATORY NETWORKS

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Abstract

This paper presents an analysis of research on Impulsive Genetic Regulatory Neural Networks (IGRNs). These networks represent a specialized type of biological regulatory systems, which are subject to disruptions in their activity or sudden changes in their dynamics.





Various mathematical models are being considered and detailed techniques are used to analyze the impact of impulsivity on gene expression models. The analysis of these networks, examines how impulsive genetic regulatory networks change the dynamics of gene expression and what their impact is on regulatory processes in cells.

The overview ends with summary of the obtained findings and conclusions, emphasizing the importance of impulsive genetic regulatory networks for interpreting complex mechanisms of gene regulation. This lays the foundation for future research and development in the field of gene regulation and cellular biology.

2

ON THE COHEN-GROSSBERG-TYPE NEURAL NETWORKS

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Abstract

Over the past two decades, there has been a huge interest in the use of artificial neural networks in various fields. Numerous scientists are turning their attention to developing and improving different models of neural networks. Behaviour of Cohen-Grossberg-type neural networks is researched, including time delays and impulses effect over the stability of the system. It is believed that shown results are useful for the design and exploration of CGNN-type models by researches.

Keywords: neural networks, cohen-grossberg, delay, impulses.

3

INTELLECTUAL ANALYSIS OF DATA IN AN INFORMATION SYSTEM FOR THE MEDICAL FACILITY

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Abstract

The purpose of this article is to study semantic models of information systems for the compilation of electronic medical records to help young doctors. The methodological basis of the work is the theory of relational databases, the theory of higher-order predicate calculus, fuzzy logic, and the theory of frame networks. Semantic models have been developed that allow for the creation of a new formal apparatus for creating a knowledge representation methodology in a hierarchical framework, allowing increased flexibility and presentation of output data for inference, reduction, and consumption of computational resources. A fuzzy inference technique is described that uses a knowledge base based on a hierarchical framework, which speeds up the final process by simplifying the obtaining of the initial premises compared to other methods.





Keywords: *information system, data analysis, algorithm, fuzzy inference, semantic model.*

4

MATHEMATICAL MODELING FOR IMAGE RECOGNITION USING ARTIFICIAL INTELLIGENCE

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Abstract

In this paper, we study a mathematical model for pattern recognition using neural networks. A feed-forward neural network was built with the capabilities of a graphics accelerator, based on the Levenberg-Marquardt method. The introduced model summarizes and proposes a new neural network training algorithm with Bayes regularization, Nguyen-Widrow initialization, and the early stopping and control method. This enables and greatly expands the efficiency of solving problems where pattern recognition is available.

Keywords: *mathematical modeling, neural network, image, algorithm.*

5

RESEARCH OF DIGITAL COMMUNICATION SYSTEM WITH QPSK MODULATION

Yuri Zhelyazkov, Kremena Dimitrova

Abstract

The paper presents basic theoretical information about digital communication systems with QPSK modulation. The block diagrams of receiver and transmitter models of a digital communication system with QPSK modulation are described. Separate functional components that make up the receiver and transmitter have been developed, and the results of their modeling are also presented.

Keywords: *modeling, digital communication system, QPSK modulation.*

6

MODELING AND RESEARCH OF TECHNOLOGICAL SYSTEMS FOR POWER GENERATION

Evgeniya Vasileva

Abstract

One of the priorities laid down in the Strategy for sustainable development of the country until 2030 is to increase the share of electricity produced from renewable sources in gross final consumption. The article proposes a variant solution for the construction of a two-component power supply system, composed of a photovoltaic generating source and wind





generators, replacing the electricity produced by a coal plant. The reduction in carbon emissions is calculated.

Keywords: *renewable sources, PV system, wind turbine, carbon emissions, sustainable development strategy.*

7

ON THE STABILITY OF SETS AND MANIFOLDS FOR IMPULSIVE REACTION-DIFFUSION COHEN-GROSSBERG DELAYED NEURAL NETWORKS

Cvetelina Mihailova

Abstract

In this paper, we introduce the notion of stability of sets and manifolds for reaction-diffusion Cohen-Grossberg neural networks with time-varying delays. The Lyapunov-Razumikhin technique and a comparison principle are adapted to prove the new stability criteria. Examples are considered to demonstrate the effectiveness of our results.

Keywords: *reaction-diffusion equations, delays, impulses, sets, manifolds, stability*

8

EXPERIMENTAL STUDY OF ILLUMINATION IN LABORATORY ROOMS

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Abstract

The purpose of this paper is to investigate and improve the level of illumination in laboratory rooms using innovative and energy-saving methods. The proposed approach makes it possible to obtain an accurate and functional way of placing artificial lighting in a similar type of premises. The obtained results, based on the conducted experiment, have been analyzed and compared with the current standards and norms.

Секция „Туризм, хранителни и текстилни технологии“ FIELDS “Tourism, Food and Textile Technology”

1

PRACTICING CHILDREN'S BODY FOR GIRLS OF THE SECOND GROWTH GROUP

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Abstract

The assortment of children's clothing is very diverse, both in terms of purpose, materials used and technological implementation, as well as in terms of the shape of the elements, color combinations, decorative solutions, etc. This is due to the peculiarities of the physical, psychological and physiological development of children of different ages. In terms of shape and proportions, children's clothing differs too much from adult clothing. These differences are primarily due to the unstable and rapidly changing proportions between the individual parts of the child's body. Based on the established age-related changes in the proportions of the child's body, the dimensional characteristics of the typical figures are given in separate standards. Each of them divides the children into four groups according to their main size characteristics.

Keywords: Children's bodysuit, girls' sizes, basic construction, correction factors.

2

RESEARCH ON SUSTAINABLE ELEMENTS AND INTERCONNECTIONS IN THE BULGARIAN NATIONAL COSTUME

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Abstract

In recent years, a new trend called sustainable fashion has emerged. It represents new ethics of production and consumption, characterized by slowing down the fast-changing fashion trends, responsible use of natural resources, and preserving them for future generations.

An important factor for the sustainability of clothing is their design. The Bulgarian national costume is one of the most beautiful and ornate in Europe, offering opportunities for designing garments with sustainable and innovative designs. The embroidered ornaments not only serve a decorative purpose but also have a protective function. Our ancestors believed that by embroidering specific parts of the clothing, they would imbue the wearer with certain powers. Therefore, the embroidered motifs cannot be seen as separate elements from the garments as they are closely connected to their placement. This necessitates considering not only their appearance and geometry but also their placement when adapting them into contemporary clothing.

This current research presents a study on the sustainable interconnections in the Bulgarian national costume. The study focuses on the relationships between the type of ornament, its placement on the garment details, and its color palette.

Keywords: Sustainable Fashion, Bulgarian National Costume, Women's Folk Costume, Embroidered Ornament, Colorful Patterns.

3





TEXTILE DESIGN BASED ON BULGARIAN EMBROIDERED ORNAMENT

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Abstract

Since ancient times, people have sought to adorn their clothing. Embroidered ornaments can be seen as one of the earliest attempts at textile design. The Bulgarian national costume is one of the most ornamented in Europe, providing an opportunity for the creation of new innovative clothing designs.

There is a known functional dependency between fabrics and clothing. Embellishing clothing with embroidery significantly increases its cost, necessitating the production of fabrics with corresponding designs.

This current study focuses on the most common Bulgarian embroidered ornaments. The basic types of embroidered ornaments have been adapted for application in fabric design. Various fabric designs based on Bulgarian embroidery have been created, illustrating their application in clothing design.

Keywords: Sustainable Fashion, Bulgarian National Costume, Women's Folk Costume, Embroidered Ornament, Design, Fabrics, Clothing.

4

DESIGNING STAGES IN CREATING INOVATIVE CLOTHING MODELS
IN CATEGORY LUXURIOUS BRAND

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Abstract

This article reviews the stages of creating clothing models in the category luxurious brand. Terms (concepts) such as “Luxury”, “Silent luxury”, “Luxurious brand”, “Mass ready-made clothes” are explained and clarified. With the development of technology, new techniques and equipment are created, which put the focus on intricate designs for the luxurious brands and differentiate them from the mass-produced, ready-made clothing. New processes and materials appear that distinguish the innovative clothing models from their mass ready-made counterparts. Different paths can be chosen in the making of a particular clothing model, where the idea is to demonstrate and emphasise the quality of the luxurious brands. The design, creation and modelling of sophisticated innovative clothing models turns into creative work, especially when it comes to luxurious clothing brands.

Keywords: designing, innovation, clothing, brand, model, stage





5

RESEARCH OF DIGITAL PRINTING ON TEXTILE SUBSTRATES AS INNOVATIONS IN THE TEXTILE INDUSTRY

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Abstract

In the conditions of a market economy and the presence of uncompromising but fair competition, every producer, if he wants to keep his place in the market and conquer new market niches, is obliged to produce competitive and high-quality products.

Company "E. Mirollo" EAD - Sliven is specialized in the production of digital printing on cotton and viscose fabrics. The technological cycle goes from raw fabric through preparation for printing (plating), digital print printing, foaming, washing and softening of the finished products.

Advances in the field of computerized design development and transfer via electronic communication systems to printing machines enable the conversion of fully automated processes. Thanks to the fact that all stages such as: patterning, then setting up the pattern for printing, the printing and vaporization itself are carried out on machines and products combining top technologies are used, the efficiency of production is increased.

In the era of digital technology, mankind's aspiration is to increase the productivity of machines and create quality output. Digital machines greatly reduce pattern preparation time. There is no need to prepare and make templates. Samples and small quantities can be printed quite economically with an unlimited number of colors.

6

SENSORY ATTRIBUTES OF GLUTEN FREE COOKIES WITH ALMOND COLD-PRESSED OIL BY-PRODUCT

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Abstract

The agro-industrial by-products created during the cold pressing of oils contain a significant amount of biologically active substances (BAS). The process is executed without heat treatment or any treatment with organic solvents, therefore the BAS that can be partitioned either into the oil or into the by-product remain unchanged. Nowadays, there is a trend to obtain almond oil by cold pressing, and by doing so, large amount of



waste (by-product) is created. This by-product has a high-value potential and can be used for various purposes such as animal feed, fuel, cosmetic product or even as a potential ingredient in food.

The paper investigates the potential use of almond oil by-products, which contain biologically active substances, in the production of gluten-free cupcakes. Four types of gluten-free cookies were produced, with varying amounts of almond oil by-product flour used as a replacement for gluten-free flour: cookies with 20%, 40% and 60% replacement of gluten-free flour with almond oil by-product flour, compared to control cookie (without replacement of gluten-free flour with almond oil by-product flour). A sensory analysis was conducted to evaluate the color, shape, texture, smell, taste, and overall acceptability of the cookies according to 9-point discontinued hedonic scale. The results showed that the cookies with the highest level of almond oil by-product flour replacement (60%) were the highest ranked in all parameters, except for smell and taste. The study highlights the potential for utilizing agro-industrial by-products to create high-value products, such as gluten-free cookies, and reduce waste in the production process.

Keywords: almond oil by-product, cookies, gluten free, food waste utilization.

7

ВЪЗМОЖНОСТИ И ПРЕДПОСТАВКИ ЗА РАЗВИТИЕ НА КУЛТУРЕН ТУРИЗЪМ В ГРАД СЛИВЕН

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Резюме

Туризмът е възникнал още от древни времена, но ограничен първоначално като привилегия на богатите слоеве от обществото. Той постепенно се разраства, за да бъде днес неразделна част от модерния живот на съвременния човек. За по-малко от век се превръща, в определящ фактор за живота на милиони хора и интегрална част от икономическата, социалната и културна дейност на много страни по света. Много малко са тези, които са останали незасегнати от него в една или няколко от неговите разнородни форми.

Ключови думи: Туризм, културно – историческо наследство

8

STUDIES ON THE CHEMICAL COMPOSITION OF ETHANOL SOLUTIONS OF ESSENTIAL OILS. 1. CLARY SAGE (SALVIA SCLAREA L.)

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Abstract

The essential oil of clary sage (Salvia sclarea L.) finds application in the food industry, in perfumery and cosmetics, as well as for the isolation of the main component, the monoterpene ester linalyl acetate. The aim of the present work was to follow the change in the chemical composition of the clary sage essential oil dissolved in six ethanol solutions of 70, 75, 80, 85, 90 and 95% concentration at oil : solvent ratio = 1 : 5. The solutions were dominated by oxygenated monoterpenes, followed by oxygenated diterpenes and oxygenated sesquiterpenes. Depending on the concentration of ethanol, the amount of the major component linalyl acetate (from 34.10 to 46.81%), of the predominant monoterpene alcohols β -linalool (from 30.85 to 41.76%) and α -terpineol (from 5.37 to 9.58%) and of the diterpene alcohol sclareol (from 3.22 to 5.04%) varied. The lower concentration of hydrocarbons in the solutions with increased ethanol concentration is explained by their more difficult solubility.

Keywords: clary sage essential oil, ethanol solutions

9

CREATING A FEELING OF IMPORTANCE AND MOTIVATION IN TOURISTS (CONVERTING THEM INTO REGULAR CUSTOMERS)

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Abstract

Tourism is an emotion, a treatment, an attraction, an entertainment. Through the new century tourism will convert in leading industry in many countries. Tourism is the fastest growing economic sector. The tourism sector increases people's welfare and reveals new work places. To be content and satisfied when one feels important and useful to a particular cause is hardwired into every human DNA. In this scientific report we will focus on creating such a feeling and impression among our guests and give the tourism industry its deserved place in creating happiness and elation in every single tourist. All human being want to reach their respective apex. This is precisely the feeling that makes a person happy.

Keywords: importance of tourism, motivation, growth of tourism

10

SOME MOMENTS FROM THE HISTORY OF THE INDUSTRIAL PRODUCTION OF SOCKS IN THE TOWN OF SLIVEN – BULGARIA

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Abstract

Some moments of the history of hosiery production in the town of Sliven are analyzed, with a greater emphasis on the period after 1997. Schematically presents the creation of the main manufacturer of socks in Sliven after the nationalization of 9 private hosiery factories in 1947. The creation of the "Osmi Mart", "Dobri Zhelyazkov" and "Tony" factories followed with the same scheme, and finally the denationalization and final privatization of the company in 2006. The process of creating new private hosiery companies after 1997 is examined. and their status in 2023.

Keywords: Socks, Sliven, history.

**Секция „Природни науки“
FIELDS “Natural Sciences”**

1

**HORIZONTAL SUBSURFACE FLOW WETLAND – A SUSTAINABLE SOLUTION FOR
PETROLEUM CONTAMINATED WATER TREATMENT: A REVIEW**

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Abstract

Constructed wetlands are a sustainable and low-cost method for wastewater treatment. This paper reviews some available field studies in order to determine the optimal conditions for oily-contaminated wastewater treatment in areas with a continental climate. Highly effective horizontal subsurface flow constructed wetlands have been found to be effective in removing organic contaminants from the wastewater through a combination of processes. The field studies have shown that the subsurface horizontal flow constructed wetlands can achieve high removal rates of petroleum contaminants (>96%). Wetland plants play a crucial role in the purification process through the accumulation of contaminants. The efficiency of the treatment process is dependent on various factors, such as the design and operation of the wetland, the characteristics of the wastewater, and the environmental conditions.

Keywords: wetlands, sustainability, efficiency, petroleum contaminants.





2

REVIEW ON LOW-COST NON-CONVENTIONAL ADSORBENTS AND THEIR APPLICATION IN WASTEWATER TREATMENT

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Abstract

There are some natural wastes that are available to us in the environment but have insignificant use or are unusable. The possibility of using all such materials as low-cost adsorbents for wastewater treatment can simultaneously solve the problem of treating bulk-produced waste and provide economical and diverse alternatives. Low-cost or green adsorbents can originate from agricultural sources, for example, vegetables, fruits, and coffee; agricultural residues, for example, wheat straw, rice husks, and nut shells; and agricultural by-products, like organic wastes. In the last three decades, scientists all over the world have been developing approaches for using non-conventional adsorbents and their possible application in industry. It has been made an overview of liquid-solid adsorption processes, looking at examples of some conventional and non-conventional adsorbents for the removal of various types of pollutants (heavy metals, dyes, phenols, pharmaceuticals, and pesticides) found in wastewater.

Keywords: adsorption, non-conventional adsorbents, wastewater

3

AN OVERVIEW OF WATER CONSUMPTION IN BULGARIA

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Abstract

In the present study an overview of the water consumption in Bulgaria is presented for the period 2010-2020, with a focus on the structure of water consumption. The main trends regarding water supply and water consumption in the country have been identified. During the 10-year period, the levels of total annual water consumption slightly decrease from 4,821.28 million m³ in 2010 to 4,310.19 million m³ in 2020. Persistence is observed about the priority of surface water use compared to underground water use. The largest relative share in the total water consumption is related to the industry within 85 - 87%, followed by the agriculture, forestry and fisheries sector varying between 6 and 8%, and household consumption showing 5-6%. The relative share of the services is about 1 to 2 % of the total water consumption. Regarding the industrial water consumption, the largest is the share of water used for cooling in electricity, gas, steam and air conditioning sectors, varying from 83% (2013) to 91% (2015, 2020). The water needs





are satisfied mainly by self-provision and other water supplies and presents about 91-92% of the total water used, while the water supply and sewerage companies (WSSC) provides only between 8-9% of the total consumption of water.

Keywords: *structure of water consumption, water supply, public water supply, self-provision, water users*

4

GENERATED WASTE ECOLOGICAL MANAGEMENT AT LOW AND HIGH RISK POTENTIAL ENTERPRISES

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Abstract

One of directions under which a production process efficiency is analyzed is the waste generated amount per unit of product. Study analyzes generated waste groups amount by enterprises, which are global producers in various sectors and their production sites are located in Devnya Municipality - Solvay Sodi AD, Devnya cement AD and Agropolychim AD. For the period 2011-2020 are examined waste groups and their quantities. Efficiency of the applied waste management is assessed by analyzing the annual generated waste groups amount and the emerging trend for the studied period.

Keywords: *environmental performance, ecological management, risk potential, generated waste*

