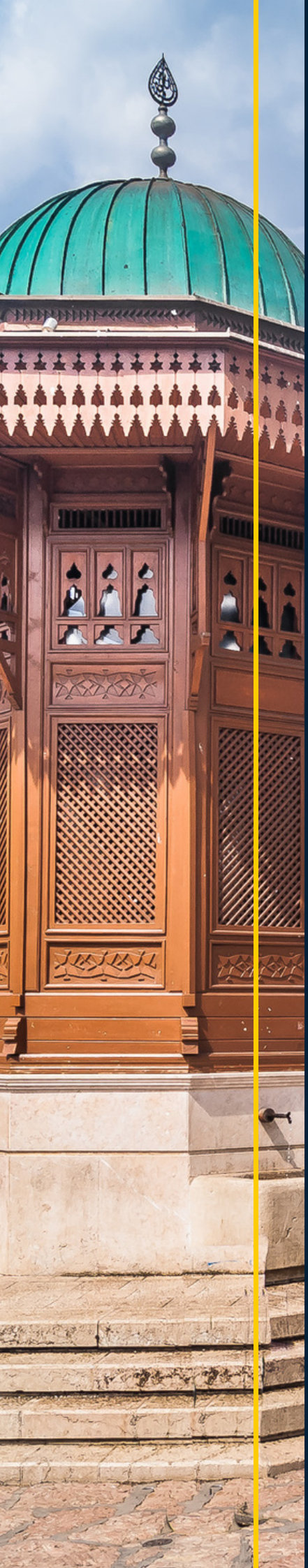

ICENS

7TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCES

BOOK OF ABSTRACTS

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WELCOME TO ICENS 2021

On behalf of the organizing committee, we are pleased to announce that the 7th International Conference on Engineering and Natural Sciences (ICENS 2021) held from June 23 to 27, 2021 in Bosnia and Herzegovina. ICENS provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Engineering and Natural Sciences issues. The conference seeks to contribute to presenting novel research results in all aspects of Engineering and Natural Sciences. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Engineering and Natural Sciences. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in all areas of Engineering and Natural Sciences. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. The scientific program will focus on current advances in the research, production and use of Engineering and Natural Sciences with particular focus on their role in maintaining academic level in Engineering and Applied Sciences and elevating the science level. The conference's goal will to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in clinical trials and scientific experiments.

Best regards,

Prof. Dr.Özer ÇINAR

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DESIGNING A NEW INDUSTRIAL DISHWASHER WITH INNOVATIVE DRYING SYSTEM FOR ENERGY AND CLEANING CHEMICAL SAVING

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Abstract:

Industrial dishwashers are among the products that must be used in all industrial kitchens. Unlike existing industrial dishwashers, there is an increasing demand for products that meet customer demands and needs with drying technology and save energy and detergents. International dishwasher manufacturers are doing extensive researches on zeolite mineral in drying, so that there are no water drops and detergent stains (including plastic container surfaces) on the surfaces of the dishes, and that they contribute to energy and chemical savings by preventing re-washing of sensitive products (crystal glass glasses, etc.). Stating that they prevent the spread of excess steam when opened, they highlight these products as environmentally friendly and value-added products compared to standard household products. Our company manufactures industrial dishwashers in various models and capacities. There is no domestic industrial dishwasher that saves energy and cleaning chemicals by using a mineral in the drying process in Turkey. Drying is performed only with a snail fan in conveyor type industrial dishwashers. In this work, we developed a prototype by doing experimental and numerical R&D studies. The most important innovative aspect is that the original design industrial dishwasher prototype, which saves energy and cleaning chemicals with its original designed drying system (using a mineral that retains moisture and converts it into heat energy), has been the most important innovative aspect. With the original design and prototype manufacturing of an industrial dishwasher prototype that saves energy and cleaning chemicals with its innovative drying system, for the first time in our country, with studies based on R&D systematics, it has been ensured that a commercialized prototype with different technological features than our current product is developed in cooperation with the industry-university.

Keywords: Industrial Dishwashers, Drying And Washing Technology, Energy Saving, Cleaning Chemical Saving.

Acknowledgment: This study was prepared within the scope of TUBITAK-TEYDEB 1501 coded Industrial Research Technology Development and Innovation Projects Support Program titled "Industrial Dishwasher Design and Prototype Manufacturing with the Innovative Drying System to be Developed" and numbered 3191398. We would like to thank TUBITAK-TEYDEB Machine-Manufacturing Technologies Group (MAKITEG) for their contribution to the project.
*

ICENS 7TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
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DEVELOPMENT OF THE INNOVATIVE BLOOD STORAGE REFRIGERATOR PROTOTYPE THAT PROVIDES SAFETY REQUIREMENTS FOR THE MEDICAL SECTOR IN ACCORDANCE WITH ATEX DIRECTIVE

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Abstract:

Blood storage refrigerators stand out as critical products that are used to preserve blood and its products at certain times and temperatures in hospitals and blood centres. Although there are industrial refrigerators with various features among our company's products, we did not have a blood storage refrigerator product for the medical sector. There are only few companies manufacture blood storage cabinets in Turkey, and none of them fulfils high security requirements in accordance with the ATEX Directive (2014/34 / EU). There are international competitors developing blood storage refrigerators and offering to the market as a product with high added value compared to industrial refrigerators. Our newly developed blood storage refrigerator, which meets the safety requirements in accordance with the ATEX Directive for the first time in our country with studies based on R&D systematics, is a prototype that can compete and commercialize with international products in the medical field. The prototype meets the cooling, hygiene, health and safety requirements of the original designed blood storage refrigerator prototype, which works according to various international standards for the medical device sector (EN 60079-0, EN 60079-15 etc.) and ATEX Directive (2014/34 / EU). It has been obtained in accordance with the study for high level whole blood.

Keywords: Blood Storage Refrigerators, ATEX Directive And Safety Requirements, Refrigeration Technology.

[*]This study has been prepared within the scope of TUBITAK-TEYDEB 1501 coded Industry Research Technology Development and Innovati.

Acknowledgement: This study has been prepared within the scope of TÜBİTAK-TEYDEB 1501 coded Industry Research Technology Development and Innovation Projects Support Program titled "Innovative Blood Storage Refrigerator Design and Prototype Manufacturing that meets the Safety Requirements for the Medical Sector in accordance with the ATEX Directive" and has been prepared from the project number 3190649. We would like to thank TÜBİTAK-TEYDEB Machine-Manufacturing Technologies Group (MAKİTEG) for their contribution to the project.

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TIME DEPENDENT MICROGRAVITY DATA ANALYSIS OF THE 30TH OCTOBER 2020 SAMOS EARTHQUAKE

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Abstract:

The subduction of the Eastern Mediterranean oceanic plate under the Aegean microplate and the westward movement of the Anatolian microplate along the North Anatolian Fault Zone provide the formation of regional deformation. The region of the Northern Samos Fault, which is the source of the 30 October 2020 Samos Earthquake (Mw=6.9), corresponds to a highly deformed back-arc area in the middle-eastern part of the Aegean microplate. The main shock of 30th October 2020 Samos earthquake was connected to Izmir average 70 km away. After the Samos Earthquake, structural damage occurred in the buildings in Bornova and Bayrakli districts of Izmir such as total collapse (17 buildings), severe damage, moderate damage and mild damage. During this time, about 115 people died. In more than one week, close to five thousand aftershocks occurred, within this scope, time depending microgravity data were measured. The microgravity method is affected directly by density distribution under the surface and especially the mass changes to surrounding environment. The time dependent microgravity data show the vertical movements of the masses in the measurement time scale. In this study, vertical mass changes belonging to time dependent microgravity data of around the Izmir (Turkey) were presented in the years 2009, 2010, 2011 (Project no TUBITAK 108Y285) and 2020 (TUBITAK Earthquake Focused Earth Sciences Research Area Fieldwork), at the same stations. The microgravity data in 2020 were measured right after 30th October 2020 Samos earthquake. In the time dependent microgravity studies were carried out at 7 stations in Izmir, where 30th October 2020 Samos earthquake destruction damage was high. After that, using GravProcess software, the data were analyzed with the help of the network solution. As a result, network results, the drift corrections, Free air gravity values, Bouguer gravity values, Gravity field values and pressure effect values were obtained.

As a result, it was examined together with the time dependent microgravity measured in the years 2009-2010-2011-2020. Possible earthquake effects on microgravity values before and after the 30 October 2020 Samos Earthquake were evaluated.

Keywords: Time Dependent Microgravity, 30th October 2020 Samos Earthquake, Mass Changes

*

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PRELIMINARY EVALUATIONS OF MICROGRAVITY DATA OF DATCA PENINSULA

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Abstract:

Turkey is one of the most tectonically active regions in the world and it is a natural laboratory for the earth scientist. In Turkey, Western Anatolia has an important status by containing many grabens with different tectonic settings. In southwest of Western Anatolia, Datca Peninsula and its surroundings which contains Datca Graben and Datca Fault is one of the active regions. In the south of Datca Peninsula, the African plate plunges under the Aegean block. Datca is close to the Hellenic arc in the Mediterranean. This tectonic movement causes big and deep subduction zone earthquakes. In this tectonically active region where Datca Peninsula is located, many major earthquakes have occurred since BC. It has drawn attention that sufficient study has not been realized up to present in order to lighten the tectonic of Datca Peninsula. In this study, Datca Peninsula was chosen as the study region. Datca Graben, which is an important tectonic structure in Datca Peninsula, is a collapse area located in the central part of the E-W trending peninsula. Datca Graben started to develop as a collapse basin controlled by NW trending boundary faults during Pliocene, and continued to develop as a lagoon-stream environment connected with shallow sea in the Late Pliocene. Datca Graben is bordered by Datca Fault in the north. NW-SE trending Datca Fault is an active fault including a growth fault with terrestrial sediments.

The microgravity method is directly affected by the density distribution under the surface and especially by the presence of gaps that create mass loss compared to the surrounding density. Therefore, for lightening the subsurface mass changes of Datca Peninsula, within the scope of the Dokuz Eylul University Scientific research project (No: 2020.KB.FEN.021), the microgravity measurements were obtained as profiles in October 2020 and subsurface mass changes of the study area were investigated. As a result, within the scope of this study, preliminary evaluations of microgravity data measured for the first time in Datca are presented.

Keywords: Western Anatolia, Datca Peninsula, Microgravity

*

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VALIDATION OF QUECHERS METHOD FOR THE ANALYSES OF CHLORPYRIFOS-METHYL, LAMBDA-CYHALOTHRIN, TEBUCONAZOLE RESIDUES IN GRAPES

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Abstract:

Method validation (MV) is an important quality parameter in pesticide residue analyse and has a direct impact on the quality of data. MV is the process of verifying that a method is fit for purpose All methods used in pesticide residue analysis must be validated prior to original laboratory samples. Working with validated methods is also a basic requirement in ISO 17025 and OECD - GLP quality systems. This study was carried out to validate QuEChERS Official Method 2007.01 method using grapes spiked at 0.1 x maximum residue limit (MRL) 0.1 x MRL and 10 x MRL levels of the three (,chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole) pesticides. For the extraction and cleanup, QuEChERS 2007.1 version was followed, then the samples were subjected to LC-MS/MS for chromatography. For the quantification represenative (apple) matrix-matched calibration (MC) was used to compansate matrix effect. Detection limit of three pesticides blow the EU-MRLs. The recovery ranges were 91.3%-131.4% (mean 114.80%), 85.8%-133.2% (mean 108.05%), 90.3%-111.6% (mean 102.96) for chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole, respectively. The overall recovery of the QuEChERS method was 108.6% with a relative standard deviation (RSD) of 11.8% (n= 108). These figures are within the recovery limits (60-140%) and the values specified for the repeatability (RSD ≤ 20%). %). The calibration curves of three pesticides were linear (R≥0.999) Precision, accuracy and linearity were also within the required limits. All the required method validation criteria were met in this study. QuEChERS method was found suitable for the analyses of chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole residues in grape under our laboratory conditions.

Keywords: Grape, Method Validation, Pesticide Residue, Representative Matrix

**This study is a part of the master degree thesis of the first Aysegul Duman (School of Graduate Studies, Department of Plant Protection, Canakkale Onsekiz Mart University). This work is supported by Canakkale Onsekiz Mart University The Scientific Research Coordination Unit, Project number:FYL-2020-3359.*

[*]This work is supported by Canakkale Onsekiz Mart University The Scientific Research Coordination Unit, Project No:FYL-2020-3359.

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REMOVAL OF SOME PESTICIDE RESIDUES FROM GRAPES AND PEPPERS BY DIFFERENT WASHING TREATMENTS

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Abstract:

The effects of washing treatments on removal rates of pesticides residues on gapes (chlorpyrifos-methyl and lambda-cyhalothrin) and peppers (acetamiprid, chlorpyrifos and formetanate hydrochloride) were investigated. For method verification study, blank grapes and pepper samples were spiked with 0.5, 1 and 5 times of MRL, and 0.1, 1.0 and 10.0 times of MRL, respectively. QuEChERS method yielded an overall-recovery of 101% (RSD= 9.31%) and 104.91% (RSD= 13.41%) for grapes and pepper , respectively. These figures were within the SANTE recovery limits (60-140%). Methods revealed that the detection limits of the all pesticides in both matrix were below the MRLs. Grapes, grown in vineyard, were sprayed with pesticides 4 times and harvested 0, 2, 4 and 7 days after the last spray. Capia peppers grown in open fields were sprayed 3 times with pesticides and harvested 0, 2, and 3 days after the last spray. Then the grapes and peppers were subjected to tap water, acetic acid and citric acid washing and ultrasonic cleaning treatments. Based on harvest times and two different washing durations, processing factors (PFs) and reduction rates were calculated for each washing treatment. In grape samples, washing treatments decreased residue levels and level of removal increased with prolonged washing durations. Removal levels also decreased with prolonged harvest durations from the last spray. The citric and acetic acid washing, and ultrasonic-cleaning methods yielded more efficient removals than tap water washing treatments. As to come pepper samples, the residues gradually decreased during washing treatments with increasing process duration. Similarly, a gradual reduction was noted with the progress of harvest times. This in turn corresponded to an increase in PF. Ultrasonic cleaning and citric acid washing were more effective than the others. Non-systemic pesticides (chlorpyrifos) were more readily removed than the systemic ones (acetamiprid). Similarly, highly soluble pesticides exhibited higher reduction.

Keywords: Food Processing, Processing Factor, Reducing Pesticide Residues, Washing Treatments

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THE IMPORTANCE OF SUCCESSIVE OR DOUBLE AGRICULTURAL CROPS IN SOUTH-ESTERN OF ROMANIA, IN THE CLIMATIC CHANGE PERSPECTIVE

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Abstract:

Climate change in southeastern Romania has been observed especially in the last decade, by increasing average seasonal and annual temperatures, decreasing average annual rainfall, but especially by extreme phenomena of heat, strong wind, hail and desertification.

Due to this, in the dry years, such as the last two agricultural years, the productions decreased very drastically even in the irrigated areas, feeling the need to practice double or successive crops, in order to increase the productions per hectare.

This paper presents a multifactorial experience, with 5 species of agricultural crops, sown with different densities and fertilized differently, going through all stages, from motivating the graduation of experimental factors, to soil analysis methods and production results obtained, including efficiently economic and recommendations made for farmers.

Keywords: Successive/Double Crops, Agriculture, Climatic Change Conditions

[*]This study is supported by the Ministry of Agriculture and Rural Development Romania, ADER Sector Program

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SPARSE MATRIX CONVERTER MODELLING AND SIMULATION

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Abstract:

Sparse matrix converter (SMC) is a direct AC-to-AC power electronic converter which does not contain any storage elements. SMC has an indirect topology in which there are both rectification and inversion stages with a fictitious DC link between them.This arrangement greatly reduces the size of the converter and increases reliability. Due to these advantages, SMC is used in AC drives, marine thrust systems, aerospace industry, renewable energy applications and more. In SMC, the input is directly connected to the output via a set of bidirectional power semiconductor switches. The input and output of the SMC often contains a filter to attenuate harmonic content. The output voltage magnitude and frequency can be controlled using a proper switching modulation scheme.In this work, after a short theoretical introduction to matrix converters, a three-phase SMC is modelled and simulated under different operating conditions. An LCL filter is adapted to the output. IGBT is chosen as the power semiconductor switch in rectifier and inverter stages which are controlled by sinusoidal pulse width modulation technique. It is verified by simulation cases that the designed SMC is able to operate without a storage element at the fictitious DC link under different switching frequencies and different amplitude and gain selections for rectifier and inverter stages. The switching frequency can be adjustable in the range between 20-50 kHz. It is also shown that the required SMC output voltage can be attained by varying the amplitude and gain of the rectifier and inverter.

Keywords: Sparse Matrix Converter, Indirect Matrix Converter,AC-To-AC Power Conversion, Simulation.

*

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FEVER DETECTION FROM HUMAN THERMAL IMAGES WITH DEEP LEARNING METHODS

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Abstract:

It is seen that people have a fever in influenza and similar diseases. The determination of the fever is one of the most widely used symptom in the detection of these diseases. Remote and non-contact measurement of human body temperature has an importance role, especially in the Covid-19 pandemic. In the last epidemic (SARS) and the current pandemic (Covid-19) period, remote fever screening has importance in preventing the spread of the disease in the places where there is a lot of human flow such as airports, shopping malls, schools, and hospitals. Thermal cameras has become important in fever scans due to their remote and fast measurement capabilities. In the pandemic period, it has become mandatory to wear a mask. However, due to this situation, efficient results cannot be obtained from traditional face detection algorithms when performing fever scans with thermal cameras. Since the mask affects the head thermogram of the person, human body temperature measurements performed with thermal cameras are negatively affected. Developing artificial intelligence-based systems to solve these problems come to the fore. In this proposed study, the face, mask, glasses, and temp area were determined by the deep learning method from people with masks on thermal cameras. Training was performed out on deep learning models by using transfer learning. Five different algorithms were used in object detection with deep learning. The success rates of the algorithms used in this study were compared in detecting the face, mask, glasses, and temperature area over the same data set. In this study, the experimental results were summarized.

Keywords: Thermal Camera Images, Artificial Intelligence, Deep Learning, Face Detection, Mask Detection, Fever Detection

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June 23-27 2021 (Hybrid Conference)

REFERENCE SOURCES FOR CALIBRATION OF FOREHEAD THERMOMETERS

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Abstract:

According to the recent studies, diseases caused by influenza and similar viruses increase the human body temperature (HBT). Therefore, measurement of HBT, continuous fever screening in social areas with human flow, detection of these diseases and then isolation of these people play an important role in reducing the spread of epidemic diseases. The concept of social distance, which has been mandated during the COVID-19 pandemic, highlighted the importance of remote and non-contact HBT measurements. For this purpose, HBT measurements, the use of forehead thermometers due to their ability to perform rapid and non-contact measurements in fever scans and thermal cameras has become widespread. On the other hand, it is critical to have traceable calibrations of these devices for accurate measurement. In this study, a comparative analysis for the performance of two different reference sources, which can be calibrated for forehead thermometers with high precision, has been completed. First of all, surface scanning of these reference has been done by using a high precision and resolution thermal camera, and a transfer standard reference radiation thermometer. Then, the obtained results have been compared. Moreover, the temperature distributions of the active radiant areas of the reference sources have been extracted from the obtained results. Subsequently, both sources have been set to the same temperature values at certain intervals and their stability has been checked. Besides, six forehead thermometers from different manufacturers have been calibrated by using two different reference sources and where uncertainty analysis has been performed. According to these measurements, it has been concluded that both reference sources can be used in the calibration of forehead thermometers with high accuracy.

Keywords: Calibration, Reference Source, Forehead Thermometer, Body Temperature, Active Radiative Surface

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DOES TODAY'S MAINTENANCE ORGANIZATION NEED TO BE REINVENTED?

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Abstract:

In industrial plants, a powerful, efficient, and cost-effective maintenance organization is a prerequisite for a trouble-free and cost-effective production process. In companies that want to hold their own on the market in the long term, it is no longer usual or sufficient for maintenance to react quickly to sudden damage. Instead, modern maintenance departments work primarily preventively or/and proactively to detect damage at an early stage and prevent it from the outset. However, companies with large maintenance departments have been going one step further for several years. They introduce their Reliability Engineering department! This department can improve the reliability of production equipment and further decisively reduce production losses. Consequently, production costs are reduced.

These new departments must be taken into account accordingly in the maintenance organization. Unfortunately, the current standards do not mention Reliability Engineering departments or note them only in a marginal way. For this purpose, as part of the first step of a mixed-methods study, a - worldwide - online survey was conducted among experts. The results are very revealing.

Keywords: Reliability Engineering, Maintenance Organization, Mixed Methods

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June 23-27 2021 (Hybrid Conference)

DETECTION OF MICRON-SCALE PARTICLES ON OPTICAL SURFACES BY PHOTOTHERMAL METHOD

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Abstract:

Since the physical sizes of viruses and bacteria are in nano-scale range, optical methods are more efficient among the others, due to the fast detection ability. Optical force and interferometric methods stand out among these methods. The Photothermal Common-Path Interferometry (PCI) method, has been widely used in the measurement of the absorption value of optical components and coatings in recent years. The most important feature of the PCI method is that it is less affected by ambient conditions, stray light, and vibrations since it is based on a single-beam interferometry technique. Since the PCI method comprises a combination of "pump-probe" lasers, the accuracy of the measurements directly depends on the stability of the lasers used. In this study, the short-term stability of the aforementioned lasers was increased and thus, the sensitivity of the measurements of phase-difference (originated from optical path difference on the optical surface) was increased accordingly. The optical absorption of various optical glass substrates and optical coatings was examined with the PCI method, and it was found that the optical absorption values with an absolute value of around 1 ppm were measured with 0.1 ppm sensitivity. In addition, within the scope of this study, the surfaces of various optical glasses and optical coatings were examined using the PCI method. During the experiments, using a single-mode continuous wavelength laser with wavelength of 640 nm and a long coherence length (>100 m), various dust and particles on the optical surfaces up to 100 microns in size were investigated. The effect of these particles on the optical absorption values of various optical surfaces (BK7, Fused-silica glasses, different dielectric coatings, etc.) was analyzed and discussed.

Keywords: Photothermal Method, Interferometer, Laser, Phase Difference, Optical Absorption

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ON THE CALIBRATION OF DIFFRACTION GRATING BASED MONOCHROMATORS

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Abstract:

Although mini-spectrometers based on integrated optical elements (fiber-coupled), an image sensor and a circuit are penetrating in a variety of applications, including color measurement, agriculture and food safety, process control, etc., diffraction grating based monochromators are still preserve their role as a reference device for spectral measurements. Precise characterization and calibration of spectral sensing devices, illumination sources and various optical filters and windows require a precisely calibrated monochromators. Pen-type spectral lamps filled with noble gases and their mixture are widely used for this purpose. However, these lamps are very fragile and have short life time when employed with a unproper power supply. In this work we present experimental results of application of multi-color tunable lasers source for fast and precise calibration of Czerny-Turner monochromator. The obtained results are compared with those obtained by means of several different pen-type lamps. The experimental results of this comparison are discussed in this work. In addition, we present several related measurement results obtained with a variety of precise interference filters.

Keywords: Czerny-Turner Monochromator, Multi-Color Tunable Lasers, Pen-Type Lamps, Filter

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ELECTRONIC DEFECTS RELATED TO INSTABILITY OF METHYLAMMONIUM LEAD IODIDE FILMS

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Abstract:

Organometal halide perovskites, especially Methylammonium Lead Iodide (MAPbI3) (CH3NH3PbI3), has great potential for edge technology application. However, MAPbI3 have instability problem which is mainly related with molecular or electronic defects. Electrical transport can occur either ionic or electronic in , MAPbI3 films. When measurement temperature close to room temperature (295K) electronic transport gets dominant. Another critical parameter is the measurement's time range. When the measurement time is in the seconds' range, electronic transport gets dominant again. Unfortunately, perovskites are seriously suffering from atmospheric environments. When perovskites expose air atmosphere, generally degradation is occurred which could limit application of this material. CH3NH3PbI3 degradation mechanism, in another word instability, should understand in order to produce much more stable materials. In this study, the instability which is related to electronic defects of MAPbI3 films were investigated. MAPbI3 films were deposited by thermal chemical vapor deposition (Thermal CVD) on glass substrates. Morphological differences due to deposition temperatures were defined by scanning electron microscopy (SEM) and elemental analysis were done by energy-dispersive X-ray spectroscopy (EDS or EDX). Electronic defects created by atmospheric conditions such as laboratory atmosphere ambient, vacuum ambient, deionize water vapor (DIWV) ambient and UV light soaking in order to investigated instability phenomena. Samples instability changes have been investigated by time dependent dark conductivity, temperature dependent dark conductivity and flux dependent photoconductivity. Based on results obtained in this study, degradation of MAPbI3 films dependent on atmospheric condition and surface morphology with the aspect of instability view tried to understand.

Keywords: Organometal Halide Perovskites, Methylammonium Lead Iodide, Thermal Cvd, Instability, Electrical Conductivity.

This work was founded by "The Scientific And Technological Research Council Of Turkey (TUBITAK)" with Project number 119F033.

This work benefited from networking activities carried out within the EU funded COST Action CA17126 "Toward Understanding and Modelling Intense Electronic Excitation" and represents a contribution to it.

[*]This work was founded by "The Scientific And Technological Research Council Of Turkey (TUBITAK)" with Project number 119F033.

ICENS 7TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
June 23-27 2021 (Hybrid Conference)

TAXIDERMY EFFLUENT CHARACTERISATION: A CASE STUDY IN THE CITY OF TSHWANE

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Abstract:

South Africa is a well-known destination for local and international trophy hunters. The hunted animal carcasses are processed to produce game trophies at taxidermies, which are mostly situated in the vicinity of hunting farms. Processing of skins and skulls produce effluents containing chemicals which could pose environmental risks. Furthermore, data about the quantity and quality of taxidermy effluents are scarce. This investigation monitored a taxidermy on the outskirts of City of Tshwane, South Africa, which discharged their effluent into a pond, known to emit bad smells. Effluents from the different processes were sampled for COD, chrome, chloride, fats and oils, sulphates, sodium, pH and conductivity, over a period of two years. In the same period an estimation was made of the volumes of water used in each of the treatment processes. A mass balance approach was used to determine the concentrations of the pollutants in the final effluent.

The concentration of major pollutions in the effluent were as follows: 14 327 mg O2/L (COD), 240 mg Cr/L, 4 176 mg fats and oils /L. The pH and conductivity ranged between pH 3.2 - 7.9 and 120 - 9 741 mS/m, respectively. The volume of the effluent produced was ca 68 m3/a, which resulted in mass loads of 990 kg COD/a, 16 kg Cr/a, and 137 kg fats and oils/a. These pollutants would dilute out if discharged into a large water body but the high concentrations of COD, fats and oils, and Cr pose serious environmental risks. The high COD, fat and oils concentrations just below effluent outfall would create anaerobic conditions which could negatively impact the aquatic environment. Chromium (III) could accumulate in the environment to toxic levels. Therefore, it is recommended that the effluent should be treated to remove fats and oils and to reduce the COD and chromium.

Keywords: Taxidermy Effluent, Production Of Animal Trophies, Water Pollution

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June 23-27 2021 (Hybrid Conference)

THE TRANSITION OF ROMANIAN AGRICULTURE: FROM TRADITIONAL AGRICULTURE TO A DIGITAL, AND SUSTAINABLE AGRICULTURE

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Abstract:

In the same time with the accession to the European Union, Romania benefited from the legislative framework of the common agricultural policy, a policy that influenced the sale and processing of agricultural products, major decisions on the direction of agriculture in our country and on the costs of agricultural production. Romania's image of contemporary agriculture is very different from the agriculture of European countries, it being structured differently from the rest of Europe. Romania is characterized by a lack of medium and small family farms because leaving the communist system has left its mark on their growth and development. Negotiations on agriculture (in Romania) began in November 2002 and were concluded in June 2004. In these negotiations, Romania benefited from an agreement similar to that of the states that joined the EU in 2004, namely better financing of agriculture, a stability of agri-food prices as well as real support measures for farmers (European non-reimbursable funds). The article aims to present the advantages of Romania's accession to the EU, the evolution of Romanian agriculture in this context and the presentation of state-of-the-art projects that make possible a transition from traditional agriculture to digital agriculture in which artificial intelligence makes its presence felt.

Keywords: Agriculture, Transition, Digitalization, Sustainable

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June 23-27 2021 (Hybrid Conference)

ASIALOGLYCOPROTEIN RECEPTOR TARGETED MAGNETIC NANOPARTICLES FOR HEPATOCELLULAR CARCINOMA TREATMENT

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Abstract:

Objective: Hepatocellular carcinoma is the most common type of liver cancer. Doxorubicin (Dox) is an anthracycline antibiotic and is a commonly used for cancer treatment. However, Dox has severe side effects that limit the efficiency, and it is used with drug delivery systems. Asialoglycoprotein receptors are membrane glycoprotein receptors and expressed in hepatocellular carcinoma. In this study, it is aimed to develop magnetic field and asialoglycoprotein receptor targeted, doxorubicin loaded nanoparticle system to be used in the treatment of hepatocellular carcinoma. Research methods: Magnetic nanoparticles were synthesized by the co-precipitation method. The surface was functionalized with 2-aminoethylphosphonic acid to provide the binding of arabinogalactan with magnetic nanoparticles. Then, MNP's surface was coated with arabinogalactan. After that, Doxorubicin was loaded on arabinogalactan coated magnetic nanoparticles by adsorption. The functional groups, hydrodynamic size, zeta potential, drug encapsulation efficiency, thermal stability, and magnetic characteristic of nanoparticles were evaluated. Subsequently, drug release profiles were examined at phosphate buffer (pH 7.4 and pH 6.5) and acetate buffer (pH 5.5). Results and Conclusion: The hydrodynamic size of the Dox loaded arabinogalactan coated magnetic nanoparticle was found to be 96.91±7.03 nm and the zeta potential value was determined to be -15 mV± 3.67. Dox loading efficiency was determined as 78.54 %±5.3. According to drug release tests, while doxorubicin was released rapidly from magnetic nanoparticles at acidic pH, a slower release occurred at physiological pH. Based on all the results, this drug delivery system was thought to have potential for in vitro, in vivo, and ex vivo studies.

Keywords: Asialoglycoprotein Receptor, Doxorubicin, Hepatocellular Carcinoma, Magnetic Nanoparticle, Targeted Therapy.

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INVESTIGATION OF THE POTENTIAL IN VITRO USAGE OF ASIALOGLYCOPROTEIN RECEPTOR TARGETED MAGNETIC NANOPARTICLES FOR HEPATOCELLULAR CARCINOMA

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Abstract:

Hepatocellular carcinoma (HCC) is the fourth most common cause of cancer-related death worldwide. The World Health Organization stated that by 2030, the number of deaths from hepatocellular carcinoma would be more than 1 million. It is known that there is a high amount of asialoglycoprotein receptors (ASPGR) on the hepatocyte surface, and they are intensely expressed in HCC. These properties make ASGPR an attractive target for receptor-directed drug delivery to hepatocarcinoma cells. New drug delivery systems are being developed to prevent the side effects and limitations of commonly used treatment methods. As an antineoplastic agent, doxorubicin is used for the treatment of many cancers.

This study aimed to perform in vitro cytotoxicity and biocompatibility tests of the synthesized asialoglycoprotein receptor targeted and doxorubicin carrying magnetic nanoparticles for the treatment of HCC. For this purpose, after the synthesis of magnetic nanoparticles loaded with doxorubicin, serum protein binding and hemolysis were assayed. The cytotoxicity studies were carried out on hepatocellular carcinoma cell, HEPG2, and human epithelial liver cell, THLE-2. According to the results, it was found that the prepared formulation was biocompatible, had no hemolytic effect, and created cytotoxicity in cancer cells.

As a result, it is thought that the doxorubicin-loaded asialoglycoprotein targeted magnetic nanoparticle system has a high potential for use in the treatment of hepatocellular carcinoma.

Keywords: Doxorubicin, Asiaglycoprotein Receptor, Magnetic Drug Delivery System, Cytotoxicity Studies, Biocompatibility Tests

[*]This project is supported by TUBITAK within the scope of the 1001 project with the number 119 S 496

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TARGETED DUAL THERAPY WITH CURCUMIN ENCAPSULATED LIPOSOMES FOR TREATMENT OF GLIOBLASTOMA

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Abstract:

Glioblastoma multiforme is one of the most aggressive brain tumors occurring in the central nervous system and should be treated immediately as it spreads very quickly. One of the most important limiting effects in treatment is the inability of the drug to cross the blood-brain barrier. In this situation, it is important to develop new treatment approaches for glioblastoma. In this study, carmustine, doxorubicin and curcumin loaded and polyethylene glycol coated liposomes were developed for efficient and targeted therapy of glioblastoma. As active components, carmustine is in the alkylating agent class, while curcumin is a herbal agent with a therapeutic effect. In addition, doxorubicin is used in many cancer treatments, including glioblastoma.

First, a pre-emulsion was prepared using different lipids and the lipid emulsion was passed through a microfluidic device to obtain liposomes. Optimization studies of empty liposomes were carried out and hydrodynamic size, polydispersity index, and zeta potential analyses of the samples were performed. Then, triple drug-loaded liposomes were prepared using diluted amounts of each drug, carmustine, doxorubicin, and curcumin. The encapsulation efficiencies (%) of the drugs were determined using HPLC analyses and optimum drug concentration was found as 10 µg/mL. The hydrodynamic size of the triple drug-loaded liposomes was 139.30±13.23 nm, polydispersity index value was 0.197±0.072, and the zeta potential was -24.17±3.09 mV. Finally, the surfaces of the liposomes were coated with DSPE-mPEG2000 to pass the blood-brain barrier, liposomes were also characterized. As a result of these studies, it is predicted that liposomes have a potential for futher in vitro and in vivo studies.

Keywords: Glioblastoma, Carmustine, Doxorubicin, Curcumin, Liposome, Targeted Drug Delivery

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STRUCTURAL PROPERTIES OF NANO CDO/NIO COMPOSITE THIN FILMS PREPARED BY SOL–GEL SPIN COATING TECHNIQUE

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Abstract:

With the advancing technology in recent years, semiconductor metal oxide nanostructures have become very interesting in applications such as solar cells, photodiodes, sensors and photo resistors due to their superior optical, magnetic and electrical properties. In this study, CdO, NiO and CdO/NiO nano structures were coated on the glass substrate surface by sol-gel spin coating technique. Cadmium acetate and Nickel acetate were used as sources of Cd and Ni, respectively. For the sol-gel solutions required for CdO/NiO composite coating, Cd and Ni were added to 10 ml of 2-methoxyethanol in molar ratios of 1/0, 1/1 and 0/1 in a total amount of 0.5 M. Monoethanolamine was added to the sol-gel solution at the same molar ratio as a stabilizer. The solution was stirred at 80 °C for 2 h on magnetic stirrer. The solution was rested for 24 hours and coated by spin coating method on the surface of glass cut in 25*25 mm2 dimensions and ultrasonically cleaned with acetone, ethanol and distilled water for 5 minutes each. The coatings were carried out at 1500 rpm for 10 seconds. After coating, the samples were dried at 200 °C for 10 minutes. The same processes were repeated once more to form two layers of coating. The samples were finally annealed at 450 °C for 1 hour. Structural characterizations of thin films were carried out with AFM, XRD, FE-SEM and EDS. It was seen that composite thin films were successfully created. Characteristic peaks of NiO and CdO were seen in XRD peaks. Larger-sized structures were observed on the surfaces in the CdO/NiO composite coating.

Keywords: Semiconductor, Sol-Gel, Nanomaterial, Thin Film Coating, Composite.

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NUMERICAL INVESTIGATION OF NATURAL CONVECTION HEAT TRANSFER OF NANOFLUIDS IN A SQUARE CAVITY

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Abstract:

A numerical study of natural laminar 2D convection in a square cavity with a nanofluid was made application. The application consists of a square cavity filled with a nanofluid (Cu-water). The vertical walls are kept adiabatic. While the bottom wall is hot, and the horizontal top wall of the enclosure are maintained at a relatively low temperature (Tc).The influence of Rayleigh numbers and the concentration of nanoparticles (Al2O3, Cu, Ag, and TiO2) dispersed in a base fluid (water), on the flow and a thermal field is presented. A house code in FORTRAN, based on the finite volume method, was used to simulate 2D flow with heat transfer. The results indicate that the addition of nanoparticles in pure water makes it possible to improve the heat transfer, in particular, to low Rayleigh number. Although the addition of nanofluids (TiO2 and Al2O3) also increases the heat transfer, their influence is not important as for Cu-water and Ag-water.

Keywords: Natural Convection, Nanofluids, Cavity.

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VALIDATION OF QUECHERS METHOD FOR THE ANALYSES OF CHLORPYRIFOS-METHYL, LAMBDA-CYHALOTHRIN, AND TEBUCONAZOLE RESIDUES IN GRAPES

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Abstract:

Method validation (MV) is an important quality parameter in pesticide residue analyse and has a direct impact on the quality of data. MV is the process of verifying that a method is fit for purpose All methods used in pesticide residue analysis must be validated prior to original laboratory samples. Working with validated methods is also a basic requirement in ISO 17025 and OECD - GLP quality systems. This study was carried out to validate QuEChERS Official Method 2007.01 method using grapes spiked at 0.1 x maximum residue limit (MRL) 0.1 x MRL and 10 x MRL levels of the three (,chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole) pesticides. For the extraction and cleanup, QuEChERS 2007.1 version was followed, then the samples were subjected to LC-MS/MS for chromatography. For the quantification represenative (apple) matrix-matched calibration (MC) was used to compansate matrix effect. Detection limit of three pesticides blow the EU-MRLs. The recovery ranges were 91.3%-131.4% (mean 114.80%), 85.8%-133.2% (mean 108.05%), 90.3%-111.6% (mean 102.96) for chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole, respectively. The overall recovery of the QuEChERS method was 108.6% with a relative standard deviation (RSD) of 11.8% (n= 108). These figures are within the recovery limits (60-140%) and the values specified for the repeatability (RSD ≤ 20%). %). The calibration curves of three pesticides were linear (R≥0.999) Precision, accuracy and linearity were also within the required limits. All the required method validation criteria were met in this study. QuEChERS method was found suitable for the analyses of chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole residues in grape under our laboratory conditions.

Keywords: Grape, Method Validation, Pesticide Residue, Representative Matrix

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EVALUATION OF A NOVEL BIO-WASTE OBTAINED FROM SAWDUST AS AN ADSORBENT FOR REMOVAL OF PYRONIN B DYE

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Abstract:

In this work, the evaluation of low-cost, abundantly available, efficient and eco-friendly bio-waste adsorbent (BWA) obtained from waste tea stem (sawdust tea wood) was presented as an alternative to the current expensive methods of removing Pyronin B (PyB) dye from aqueous solution. The effects of varied factors, amount of adsorbent, initial dye concentration, contact time, etc., were studied, and optimal experimental conditions were revealed. In addition, structural and morphological characterization of BWA was confirmed by FTIR, SEM study. It was found that the Lagergren's model could be used for the estimation of the system's kinetics. The present investigation and comparison with other reported adsorbents concluded that BWA may be applied as an attractive low-cost option for removal of PyB from aqueous solution.

Keywords: Tea-Waste, Pyronin B, Dye-Removal, Biowaste, Adsorption

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CONTROL ALGORITHMS FOR BOSONIC QUANTUM BATTERIES: PARALLEL VERSUS COLLECTIVE CHARGING

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Abstract:

Very recently the great progress has been achieved for a new type of quantum devices: quantum batteries (QBs) which are capable to be charged, to store the energy and finally to transfer it to consumption centers and other quantum devices. We present here our theoretical feedback control algorithms for charging Bosonic quantum batteries with two different topologies of interaction between the charger and the battery set: parallel versus collective transfer of energy. The model of QB is composed by non-mutually interacting elements (quantum harmonic oscillators) in a Markovian bath. The charger of such a battery is implemented via the field which controls pumping the energy into the batteries. We study few alternative control approaches to the charging process: Fradkov's speed gradient, Kolesnikov's target attractor and Borisenok's target repeller algorithms to track (i.e. to drive dynamically) the ergotropy and the charging power of the batteries. We discuss pros and cons of these control models for different charging schemes; demonstrate their efficiency, robustness and stability. The proposed algorithms can be applied to other physical types of quantum devices: Dicke QBs and spin QBs.

Keywords: Feedback Control, Quantum Battery, Markovian Environment

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NON-CLASSICAL ALGORITHM TO CONTROL EPILEPTIFORM REGIME IN THE SMALL POPULATION OF HODGKIN-HUXLEY NEURONS

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Abstract:

The model for controlling epilepsy discussed here is based on the seizures suppression experimental methods via the electrical stimulation of brain. It has a potential of “fine tuning” according to the epileptic pathology specifics of patients. We consider here a simplified case of an artificial neural network (ANN) with the Hodgkin-Huxley elements providing the necessary variety of dynamical regimes: individual neuron spikes and bursts which could cause the hyper-synchronized behavior of epileptiform type in the whole network. We perform a fine control of the ANN dynamics with a single element which plays two roles: it detects the coming seize and send a feedback signal to other neurons to suppress the epileptiform dynamics. To increase the quality and efficiency of the control we study non-classical (based on the quantum paradigm) algorithm. Recently we demonstrated the ability of a single Hodgkin-Huxley neuron to emulate some quantum classification and searching algorithms in a relatively profitable way. Here we reproduce our approach to detect and suppress epileptiform dynamics in the small ANN. The feedback loop to other neurons could be based on optimal / suboptimal gradient approaches or on an artificial attractor forming in the dynamical system. We study the efficiency and robustness of our proposed algorithm and discuss its pros and cons to compare with our recent classical algorithm-based model of the epileptiform suppression.

Keywords: Feedback Control, Hodgkin-Huxley Neurons, Epileptiform Dynamics

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SIMULATION OF STREAMFLOW USING SWAT MODEL

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Abstract:

In parallel with the development of computer technology and developments in geographical information systems, watershed modeling studies are also developing day by day. These models are used effectively in many studies such as water quality studies, sediment, flow estimation, the effects of climate and land-use changes. The main objective of this study is to determine the hydrological properties of the Murat-1 and Murat-2 watershed which is the subbasin of the Euphrates-Tigris watershed in Turkey and predicted the streamflow of those. The Soil and Water Assessment Tool (SWAT, version 2012) integrated with ArcGIS, version 10.7 were used for this purpose. The model was calibrated and validated using the data obtained from the monitoring station between the years 2005 to 2013 by using SWAT-CUP (version 2009) software program. The calibration and validation procedures were analyzed for the monthly periods using Sequential Uncertainty Fitting 2 (SUFI-2). Results show that the model has successfully simulated and predicted the streamflow over the watershed. Performance evaluation criteria such as Nash-Sutcliffe Efficiency (NSE) and coefficient of determination (R2) were 0.73 for both during the calibration period (2006-2010) and 0.59, 0.63 respectively for the validation period (2011-2013). From these results, its seen that simulated values are at quite acceptable ranges and the SWAT model is a suitable tool for the studied watershed. It can be also useful for the non-monitoring region by simulating the flow.

Keywords: Swat, Streamflow Prediction,Gis

This study has been produced from the doctoral dissertation of Erkan KARAKOYUN

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DETERMINATION OF WATERSHED FEATURES USING GEOGRAPHIC INFORMATION SYSTEM (GIS)

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Abstract:

A water basin covers the entire area giving water to the river between the source of the river and where it ends. In simple terms, it's the area that carries the water from higher altitude to lower altitude. Factors affecting the basin, such as topography, basin size, land use, and soil type affect the process of water from upstream to downstream. For this reason, it is important to know the properties of a basin for hydrological analysis. In this study, the boundaries of the Murat-1 watershed which is the subbasin of the Euphrates-Tigris basin were determined using Geographic Information System (GIS) and some hydrological features of the basin (flow direction, accumulated flow network, drainage boundaries, slope map, aspect map) is aimed to determine. Firstly, in the study, a digital elevation map (DEM) was obtained from Shuttle Radar Topography Mission (SRTM) satellite offered by USGS. The data obtained from USGS were merged using the ArcGIS 10.7 program and then the physical properties of the watershed were determined. As a result, GIS software, which gives faster and less costly results compared to traditional methods, has been accepted as a very effective tool in determining basin characteristics and boundaries.

Keywords: Deliniation, Gis, Watershed

**This study has been produced from the doctoral dissertation of Erkan KARAKOYUN*

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COMPARISON OF DIFFERENT STRESS-BASED METHODS FOR ESTIMATING LIQUEFACTION POTENTIAL: A CASE STUDY OF A MULTI-STORY BUILDING IN IZMIR, TURKEY

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Abstract:

Izmir is in a first-degree seismic hazard zone. The liquefaction potential of multi-story buildings is an important component in engineering projects and plays a key role in safe building design. A recent earthquake occurred along the Sisam fault significantly affected the buildings in Izmir city center. The issue of liquefaction has received considerable critical attention. Liquefaction potential is commonly evaluated by using stress-based approaches. There have been several studies comparing and criticising these stress-based methods for liquefaction potential. However, some additional discussions are needed for specific sites due to practical concerns. This study aims to compare three different widely used methods for evaluating the liquefaction potential of silty clayey sand layers as a foundation of a multi-story building in Izmir. In this context, the lateral and vertical geological and geotechnical variations in soil layers were evaluated based on three borehole logs. Grain-size distribution, relative density, initial effective stresses, and deformation history of silty sand layers were determined. A liquifiable silty clayey sand layer is present between 2 m and 11 m depth below the ground surface. The factor of safety (FOS) values for liquefaction potential were calculated regarding 5 m and 8.5 m below the ground surface. The corrected SPT-N30 values for these depths are 6 and 17, respectively. A design earthquake (Mw: 7.5) acceleration was used. As a result, the FOS values for the two depths were found to be between 0.16 and 0.92. Liquefaction potential is decreasing towards deeper elevations. The FOS values were biased up to 64% for 5 m and 60.9% for 8.5 m depth among three methods. This implied that the stress-based methods are more sensitive to N30 values for loose soil layers and hence they give widely variable FOS values.

Keywords: Liquefaction, Izmir, Multi-Story Building, Factor Of Safety, Stress-Based Methods

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HAZELNUT SHELL VALORIZATION: A DESIGN STUDY ON BIOCOMPOSITE SURGICAL MESH

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Abstract:

Hernia is defined as the abnormal exit of tissue or an organ through the wall of the cavity in which it normally resides. Inguinal hernia constitutes 75% of this disease, which is common in the society. Surgical network implantation method is generally used in the treatment of the disease. In this method, since the tissues in the implantation area are weak, a surgical patch(mesh) is placed on the area. Synthetic patches are commonly used in surgeries. The main problems with these patches are that they can relapse the infection and the disease. Recently, biocompatible composite patches including lignocellulosic structures have been preferred to solve this problem. Therefore, in this study, it is aimed to evaluate the hazelnuts shell process waste in the development novel biocomposite mesh. The mechanical properties of the designed composite mesh will tried to be improved by the addition of thermoplastic starch, nanoclay and reduced amount of polypropylene. With this develop formulation as a functional and economical product, the hazelnut shell incorporated biocomposite material, will be an alternative to its counterparts in the medical field. Three basic processes are discussed in the design process; extrusion, injection molding and sterilization processes. Effective design is aimed in the study by applying mass and energy balances throughout these processes. With the moderate scale production design, it is planned to produce 12000 meshes per month. The operational expenses of the project were calculated as $13K. The designed new composite mesh sales price was determined about 2$/cm² considering fixed costs, operational costs, depreciation costs. Consequently, it provides a price advantage compared to the sales prices of the products available in the market (11-32 $/cm²). Since there is not any production in Turkey, a highly feasible design has been indicated beneficial production of a biocompatible and long-lasting biocomposite mesh by valorization of the hazelnut shell.

Keywords: Biocomposite Materials, Hazelnut Shell, Design A Process, Surgical Mesh

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GEO-ELECTRICAL CHARACTERISTICS OF THE ERECEK-CANAKKALE REGION

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Abstract:

Biga Peninsula is one of the tectonically active regions in Northwestern Anatolia which the middle strand of the North Anatolian Fault Zone is crossed over by it. This work is aimed to model the subsurface geological structures via vertical electrical sounding (VES) and self-potential (SP) datasets collected from the relatively less known Southern part of the Biga Peninsula. The vertical electrical sounding (VES) and self-potential (SP) datasets collected near the Erecek village of Canakkale city were inverted by the Levenberg-Marquardt algorithm. Four profiles were generated covering some VES points to reveal the geological model. In addition, resistivity distributions at 10, 100, 200, 500, and 1000 meter depth were calculated. Thus, the iso-3D resistivity distribution was easily observed. Based on the VES findings, three main geological units were defined; two groups of volcanic units and a metamorphic basement. Besides, WSW-ENE and NNE-SSW trending two normal faults that have possibly water content were observed. One of them was also detected from the self-potential profile data inversion results. As a result, possible main fault locations and tectonic structures that may be associated with groundwater containment have been described using the findings of both two geoelectrical methods.

Keywords: Canakkale, Self-Potential, Vertical Electrical Sounding

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THE EFFECTS OF LIMITING FACTORS ON THE BIODEGRADATION OF ORGANIC MATTER IN MUNICIPAL WASTEWATER

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Abstract:

Wastewater or treated waste enriched with carbon-based compounds is a major polluter of water resource. The carbon-based compounds typically indicated by high BOD or COD values, which represent organic matter. This study was undertaken to evaluate the impact of specific constituents (as limiting factors) on the biodegradation of organic matter in the municipal sewage. The limiting factors included pH, temperature, organic load (COD and NH3-N), dissolved oxygen (DO), food to microorganism ratio (F/M), sludge age, hydraulic retention time (HRT), mixed liquor suspended solids (MLSS), settleability (SVI and SV), hydraulic loading rate (HLR), spulkraft flushing intensity (Sk), hydraulic load (flow) and electrical conductivity (EC). Municipal wastewater was characterised and the wastewater composition classification was summarised. By applying a regression analysis, the linear relationships of each limiting factor as applied to the process units were studied to assess their potential effect across the biodegradation treatment pathway. The results revealed the wastewater composition ranging from weak to strong wastewater strength (WWTW1: 416.22±105.54 - 915.05±328.30 mg/L, WWTW2: 247.70±124.72 - 854.14±95.18 mg/L, WWTW3: 635.23±109.85 - 873.65±336.05 mg/L, WWTW4: 647.48±44.26 - 1031.29±62.13 mg/L and WWTW5: 136.31±13.64 - 592.49±231.50 mg/L) in terms of raw COD of the five plants investigated. There was a significant seasonal difference observed on the wastewater composition. The COD removal were averaged at 74.58 to 96.62 (WWTW1), 57.74 to 94.00 (WWTW2), 89.45 to 97.22 (WWTW3), 87.30 to 97.13 (WWTW4) and 30.32 to 95.09 % (WWTW5). Statistical analysis on the seasonal plant performance comparison showed more treatment effective in the wet season with exception to WWTW3. The results confirmed strong relationship and high alignment between limiting factors and process unit performance, which supported the academic literature and theory that inefficiencies in biodegradation could be attributed to wastewater quality factors, environmental aspects, toxic compounds in the raw wastewater and organic shock on the treatment processes.

Keywords: Biodegradation, Municipal Wastewater, Organic Matter, Plant Performance, Water Resource Pollution, Wastewater Classification

[*]*This study is supported by the career management program of the Department of Water and Sanitation*

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PERFORMANCE ANALYSIS OF LONG BASELINE GPS RTK

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Abstract:

The Global Positioning System (GPS) has been used for many years to determine the precise position of a receiver in real-time. In the classical real-time kinematic (RTK) positioning method the distance between reference and rover is limited (<25 km) due to the radio communication, atmospheric conditions, and orbital errors. If the communication between the rover and the base station is supplied over the Internet, the limitations of radio modems are removed. However, the ionospheric-tropospheric errors are still a problem that cannot be easily eliminated by double-difference in long baseline RTK. This study examines the latest GPS RTK performance on four different lengths of baselines (200-, 300-, 400-, 500-km) by estimating slant total electron content (STEC) of the ionosphere and zenith total delay (ZTD) of the troposphere. RTKLIB (RTK Library) software package is used to process GPS data. 24-hour data of four baselines at 1-sec epoch interval is used to get long baseline RTK solutions. The results show that as the baseline length increases, the ambiguity fixing rate decreases. The root mean square (RMS) error of 500-km baseline is 1.9, 2.9, and 5.4 cm for the north, east, and up components, respectively, considering only ambiguity fixed coordinates. In addition, the error of broadcast ephemeris should be taken into consideration when the baseline distance over 200 km.

Keywords: Gps, Rtk, Stec, Ztd

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A NEW FILTERING AND ANALYSIS APPROACH FOR POOR QUALITY GNSS DATA

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Abstract:

Due to its globally continuous and instantaneous geolocation capability, in many areas from scientific and engineering studies to mobile applications we use in our daily lives, satellite-based positioning systems offer a unique alternative. Structural health monitoring, determination of large and small scale deformations, vehicle tracking and time-dependent location changes in many mobile applications are obtained by GNSS. However, time-series recorded by GNSS with a high sampling rate; includes common error sources such as sudden signal loss, extraneous or outlying data points, speed drifting, and signal white noise. The fact that all or some of these error sources are effective weakens the quality of recorded data. The decrease in data quality makes it impossible to draw important conclusions. Some techniques should be used to clear this data from errors and to draw meaningful results. In this study, raw GPS data recorded with a 20 Hz sampling rate in an environment with abundant error sources were parsed into sub-signals using Fast Fourier Transform (FFT) after applying a series of filtering processes. Thus, the dominant signals representing significant periodic components were determined, regardless of the nonsense sub-signals corresponding to the erroneous measurements. Then, the signal was reconstructed using Inverse Fourier Transform with the obtained dominant frequency values, and thus, the measurement values were separated from the defective components and an interpretable real and clean signal is obtained. Graphical comparisons of raw and filtered data are presented and the effect of the proposed filtration process on raw data was explained by statistical analysis.

Keywords: GNSS Data, Filtering, Fast Fourier Transform, Time Series

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EXPERIMENTAL RESULTS AND ANALYSIS OF STRUCTURAL MONITORING USING GNSS AND OTHER POSITIONING TECHNIQUES

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Abstract:

Advances in urbanization and construction technology have made buildings increasingly larger and ostentatious. These large engineering structures that push the limits of engineering and technology, it is become more affected by natural events such as wind, temperature, earthquake etc. Therefore, the construction of such structures and subsequent determination of oscillation amplitudes and spectral characteristics have become an important issue needed. In the scope of this study; GNSS receivers, electronic inclinometer, weather station and total station and reflectors for ground observations are mounted on a tower (in 165 m heights). The data collected simultaneously using this measurements instruments were analyzed and the results were evaluated. It has been observed that the displacement changes obtained from different measuring instruments are compatible with each other and are sufficient to determine this dominant oscillation mode. The movement amplitude and spectral characteristics of the structure representing the structural movements at the time of measurement were examined. The results obtained from three different measuring instruments; showed that the structure is very rigid and makes a dominant movement with a period of 24 hours. This dominant movement of the tower, which lasted for a full day, was explained by the effect of the temperature change caused by the effect of the sun

Keywords: GNSS Data, Filtering, Fast Fourier Transform, Time Series, Structural Oscillation.

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POLLUTION OF SAND RIVER CATCHMENT WATER RESOURCE BY WASTEWATER TREATMENT WORKS IN THE BUSHBUCKRIDGE LOCAL MUNICIPALITY, MPUMALANGA

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Abstract:

The pollution of water sources is a world-wide problem that is predominantly affecting rural communities that directly depend on these water sources daily for domestic use. The water quality reports by the Inkomati-Usuthu Catchment Management Agency in South Africa indicated that the number of E.coli counts were high in the Sand River Catchment. The high E.coli counts might have been as a result of overflows from manholes of the sewage system infrastructures. The aim of this study was to determine whether the effluent from the Bushbuckridge Municipality's WWTWs contributes to the pollution of the Sand River Catchment. The investigation was carried out in two WWTWs, Dwarsloop WWTW and Thulamahashe WWTW. Data were collected from participants via questionnaire, and water samples were collected from the treatment plant and catchment on a monthly basis from October 2019 to September 2020 for chemical and microbial analysis. According to the findings of the investigation, WWTWs contributed the most (51%) to the pollution of the Sand River Catchment, followed by human settlement (27%), and agriculture (22%). Therefore, the study explored the contribution of WWTWs to pollution in the Sand River Catchment. It concluded that factors such as population growth, poor operation and maintenance of WWTWs and lack of well-trained personnel contribute to partially treated effluent discharged from WWTWs to the receiving water bodies, thus contribute to pollution of the water resource. Poor budget was not spare and it has made the treatment plants to operate ineffectively.

Keywords: Catchment Management, Pollution, Waste Water Treatment Works

Tshwane University of Technology and Inkomati-Usuthu Catchment Management Agency

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ELECTROMAGNETIC DESIGN AND OPTIMIZATION OF PMSM FOR FLY-GEN TYPE AIRBORNE WIND ENERGY SYSTEMS

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Abstract:

Airborne wind energy systems have been developed as an alternative to traditional wind turbines in the last two decades due to their ability to reach high wind speeds and to use less material. They are generally categorized as on-board or on-ground according to the location of the electrical generator and both types have a tether instead of a tower. This paper presents electromagnetic design and optimization of permanent magnet (radial) electric motor/generator (pmsm) for a fly-gen (on-board) type airborne wind energy systems. The optimal parameters that give suitable power-to-weight (P/W) ratio and efficiency of machine are investigated. In addition, the effect of power distribution on total weight and efficiency according to the number of motor/generator is examined. Optimization of the machine for which the analytical model is obtained is carried out using the Matlab software with the genetic algorithm method. Three-dimensional finite element analysis method is used for the verification of the design results with Ansys-Maxwell program.

Keywords: Airborne Wind, Pmsm, Genetic Algorithm

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5G TECHNOLOGY AND AGE OF MACHINES

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Abstract:

Mobile data traffic is increasing at a logarithmic rate and new technologies are entering our lives at a dizzying speed. While the internet to date is defined as the internet of people, the internet used with 5G is defined as the internet of machines. With this revolution realized with 5G, home refrigerator, air conditioner, television, robot, etc. devices will be connected to the internet and the number of connected devices will increase exponentially. One of the most important problems facing companies working on mobile communication systems is how they will continue to efficiently serve the data traffic, which will increase enormously. All these needs and the 5G technology developed to overcome the bottleneck that will arise constitute the main agenda of companies that produce technology in this field. This article is what is 5G Technology in the age of machines and what is it aimed at? How will the high data demand and needs be met? and what are the experiences 5G technology will make possible? tried to answer the questions.

The article covers the hardware and software requirements and their solutions to meet the objectives of 5G technology (High-speed and high-capacity communication, Wide coverage extension, Low power consumption and cost, Low latency, Reliable communication, Wide connection and detection), high data demands and needs. 5G Usage Experiences Categories with recommendations (Advanced Broadband: Fast Connection in Vehicle, Cloud-Based Operations on Local Computer, Uninterrupted Communication in Busy Places / Ultra Reliable and Low Latency: Fast Stock Market Buying and Selling, Remote Live Command Systems, Quick Transmission of Eye and Head Movements , Factories Automation, Remote Surgery, Autonomous Driving, Uninterrupted Emergency Communication on Demand, / Communication of Massive Objects: Transport Services, Smart Home, Traffic Regulation, Tracking Systems, Wearable Textile) have been comprehensively studied and presented.

Keywords: 5G, Mobile Communication, Iot

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PREVELANCE OF SERRATIA MARCESCENS IN FRANKLINIELLA OCCIDENTALIS (PERGANDE) (THYSANOPTERA: THRIPIDAE) POPULATIONS IN TURKEY

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Abstract:

Symbiotic bacteria play important roles in their host life in many insects. Some symbiotic bacteria used as an alternative control method against pest insects. The western flower thrips (Frankliniella occidentalis) is important agricultural pest causing serious economic losses to vegetable and horticultural crops. This species is notorious for vectoring destructive plant viruses, as well. In this study, we investigated the prevalence of Serratia marcescens, a gram-negative bacterium belonging to the family Enterobacteriaceae, in the field collected samples of F. occidentalis in two province from Turkey. The infection rate of S. marcescens was found in 74.6 % and 73.6 %, respectively. In addition, we presented phylogenetic characterization of the bacterium, which may provide important information in developing alternative control method against this pest in future.

Keywords: Frankliniella Occidentalis, Endosymbiont, Serratia Marcescens , Phylogenetic Characterization,

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PREVALANCE OF WOLBACHIA IN CULEX PIPIENS POPULATIONS IN TURKEY

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Abstract:

Mosquitoes are a common group of insects comprising of 112 genera and approximately 3500 species (Harbach et al. 2017; Harbach 2018). The majority of the described mosquito species are considered nuisance species while only few are implicated as major vectors in the transmission of infectious diseases to humans and other vertebrate hosts. Notably, countries within the tropic and temperate climatic zones face an increased Mosquito Borne Diseases (MBD) burden and transmission risk as they display a rich mosquito biodiversity including important vector species, (Dorge et al. 2020). In recent years, Turkey, has witnessed the emergence and resurgence of a number of MBDs. In the absence of protective human vaccines against most MBDs vector control, aiming to reduce the vector population size predominantly using insecticides is key to preventing and managing disease outbreaks. Both pyrethroids and DFB are amongst the most widely used insecticides in Turkey for mosquito control (Akiner et al., 2009; Taskin et al., 2016) due to their high efficacy and low mammalian toxicity (Rinkevich et al., 2013). However, a serious public health problem associated with the extensive use of insecticides in vector and agricultural pest control is the development of insecticide resistance in many mosquito species (Feyereisen et al., 2015; Scott et al., 2015; Guz et al., 2019). Therefore, endosymbiotic bacteria has received considerable attention as a mechanism to control insect vectors. Among symbiotic bacteria, Wolbachia is widely distributed with about 70% of all insect species (Werren and O'Neill, 1997), which regulates host reproduction through cytoplasmic incompatibility (CI), feminization, male killing, and parthenogenesis (Werren, 1997; Stouthamer et al., 1999). Culex pipiens group are infected with Wolbachia wPip strains belonging to five genetically distinct groups (wPip-I to V) within the Wolbachia B supergroup. In this study, we analyzed the prevalence of Wolbachia infection Turkish Cx. pipiens populations. We also evaluated the phylogenetic relationship between Wolbachia strains isolated from various insects, and constructed a phylogenetic tree of other arthropod sequences under the NJ method. Knowledge on the prevalence of Wolbachia in Turkey might be useful for Cx. pipiens control in the region.

Keywords: Culex Pipiens , Endosymbiont, Wolbachia , Phylogenetic Characterization,

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AUTONOMOUS NETWORK MANAGEMENT IN SOFTWARE DEFINED NETWORKS

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Abstract:

Software-defined networks (SDN), a major paradigm for autonomous network management. Due to the capability of software defined networks, autonomous network management purpose to provide the Quality of Service by use of self-organising mechanism. This paper aims to present recent advances on autonomous network management in software defined networks. We also discuss challenges of autonomous network management and focus on self-organising mechanisms. Additionally, this paper purpose to help for researchers from different autonomous network management fields to current artificial intelligence key issues.

Keywords: Autonomic Network Management, Software Defined Networks, Self-Organizing Networks

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DERIVATION OF MECHANICAL PROPERTIES OF POLYESTER GEOGRIDS USING CONSTANT STAIN RATE LOADING TEST

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Abstract:

The implementation of geosynthetics in civil engineering is becoming more recognized nowadays because of its superior rewards. Geosynthetics have proven to be among the most versatile and cost-effective ground strengthening techniques and soil improvement sustainable materials. The polymeric geogrids were recommended by most of International Codes as an appropriate sustainable soil reinforcement to replace the conventional metal reinforcement that used efficiently for soil improvement, roadway applications, and Mechanically Stabilized Earth MSE walls. Thus, mechanical properties and non-linear behavior of geogrids are dominant aspect in designing the soil reinforcement, MSE walls systems and significantly affect its performance and stability as well. This research work introduces analyses and results of laboratory constant strain rate (CSR) test of 20%, 10%, 6%, 3%, 1% and 0.05% strain/min conducted on five specimens of geosynthetics polyester (PET) geogrids manufactured by HUSKER. Tests were performed according to Multi-Rib tensile method ASTM D6637. Output acceptance features of tensile ultimate strength and strain at break were justified. Secant modulus at strain 1% and 2% were derived. Sensitivity of strain rate of loading on strength, stiffness and non-linear properties of geogrid was inspected.

The higher CSR reveals increase of the measured secant modulus. The larger ultimate strength, the higher anticipated stiffness irrespective to loading strain rate. Based on the measured tensile load-strain relationship, the linear approximation of secant modulus is considerably acknowledged in the strain domain ≤ 2% which covers a wide scatter of geosynthetics reinforced structures conditions under service (working) loadings. The derived stiffness at 1% is larger than for 2% strain, which reflects phenomenon of non-linearity and stiffness relaxation with progressive elongation. Behavior of reinforced soil is sensitive to stiffness rather than strength of geogrid. For numerical modelling purposes, a simple correlation chart was developed to predict secant modulus of geosynthetic PET geogrid based on strength.

Keywords: Constant Strain Rate CSR Test, Geosynthetics, Geogrid, MSE Wall, Non-Linear, Soil Improvement, Secant Modulus

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PREDICTION OF LONG-TERM MODULUS, AND CORRELATION OF LOCAL TO GLOBAL STRAIN FOR POLYESTER GEOGRIDS UNDER SERVICES LOADING

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Abstract:

Geosynthetics have started to play a major role to effectively eradicate a numerous strew of geotechnical engineering problems, and are being widely used as a cost-effective sustainable soil-reinforcement solution. Consequently, a comprehensive look into the short and long-term properties of the geosynthetics will enable us to get a greater perception of its vital role. Comparable all polymeric products, geosynthetics are susceptible to creep. However, creep data is not published by manufactures for community to disclose stiffness modulus degradation with elapsed time, which is necessary for finite element numerical modelling. This paper assesses creep effect on long-term properties of polyester (PET) geogrid and derive calibration factor between global to local strains using in-isolation tensile response derived from the constant strain rate CSR loading tests. Hence, polyester (PET) geogrid specimens Fortrac 35T, 55T, 80T, 110T, and 150T were examined at the Machine Direction MD under CSR loading tests, ASTM D6637 using “multi-rib tensile” method. Series of CRS tests were conducted with strain rates of 20, 10, 6, 3, 1, and 0.05%/min. The long-term stiffness value decreases in non-linear manner with increasing logarithm of time but after 1000 hours, is considerably constant of 75% of the secant modulus at 2% strain (working loads). Outcome is in good agreement with consensus that, for polyester (PET) geogrid, time-dependent stiffness reductions will be minimal (25-15%). Calibration Factor CF between global to local strains ranged from 2.08 to 1.99 was introduced appropriately for the tested polyester geogrid specimens at stain domain of 2%. This derived CF is in worthy agreement with comparable PET geogrid CF of 2.2, which was introduced by Allen et al. (2002). Calibration Factor values slightly increased as strain rate decreased. Nevertheless, CF derived based on the slow rate of strain loading 0.05%/min. seems fitting to simulate the actual loading conditions at site.

Keywords: Secant Modulus, Creep Effect, Calibration Factor, Constant Strain Rate Test, Geosynthetics, Stiffness Degradation, Global/Local

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June 23-27 2021 (Hybrid Conference)

THE DEVELOPED FEA-BASED PROGRAM FOR PLANAR STATIC ANALYSIS WITH A SPECIAL 12X12 RECTANGULAR ELEMENT

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Abstract:

In this study, a computational program based on the finite element method was developed using FORTRAN programming language to study the effect of static loads on planar structures. This program is called YAY2020. Many widely used structural programs calculate static loads' effect on buildings, meanwhile, a set of calculations' assumptions are used as a basis of these programs. These assumptions may lead to unreal structural calculations and behaviors. One of the most important assumptions is the stiffness matrix of shear walls which is only composed of 8x8 elements ignoring the rotational stiffness values. In YAY2020 program, a special rectangular elements' stiffness matrix formulation with 12x12 will be used to consider rotational deformations of the share wall elements. The correctness of this formulation has been proven by comparing it with Timoshenko beam analytical analysis. The aforementioned formulation was not in the literature until recently introduced by Oztorun. All results obtained by YAY2020 will be compared with the commonly used SAP2000 software.

Keywords: FORTRAN, Finite Element Analysis (FEA), 12x12 Rectangular Stiffness Matrix, SAP2000 Program, Static Analysis Software, Timoshenk

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THE DEVELOPED FEA-BASED PROGRAM FOR PLANAR DYNAMIC ANALYSIS WITH A SPECIAL 12X12 RECTANGULAR ELEMENT

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Abstract:

There are several widely used structural software to analyze buildings under dynamic loads, but many of these programs use arithmetic formulations to calculate the mass and stiffness matrices of shear walls with only 8x8 elements that ignore the rotational mass and stiffness values. Also, during the dynamic analysis, a system diagonal mass matrix containing only elements in the X and Y directions is used. The previously mentioned calculation assumptions may lead to unrealistic structural calculations besides these assumptions should be replaced by more realistic calculations formula and methods. In this paper, a two-part FEA computational program was developed to provide actual structural dynamic analysis. The first part of the program is called YAY2020-Static encoded by FORTRAN compiler and the second one is called YAY-Dynamic encoded by MATLAB interpreter. In YAY2020 program, a special rectangular element formula with 12x12 elements and three degrees of freedom at each element's nodes is used to calculate shear wall mass and stiffness matrices to obtain system full-size stiffness and mass matrices that contain both diagonal and non-diagonal elements. Results obtained using YAY2020 software will be compared with some structural analysis techniques such as shear building and wide column, to study the feasibility of using these techniques. All obtained results by YAY2020 will be compared with the commonly used FEA structure software SAP2000.

Keywords: Dynamic Analysis Software, FORTRAN, Finite Element Analysis (FEA), 12x12 Mass Matrix, Shear Building, Timoshenko Cantilever Beam

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SYNTHESIS AND CHARACTERIZATION OF SR-DOPED NIO NANOPARTICLES SYNTHESIZED BY HYDROTHERMAL METHOD

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Abstract:

Metal oxide semiconductor nanoparticles with and without dopant have been preferred in electronics, solar cell, photodiode and energy storage systems due to their superior properties in recent years. In present study, Nickel acetate and Strontium nitrate were used for Ni and Sr sources, respectively. To produce pure NiO nanoparticles, 0.5 M Nickel (II) chloride hexahydrate was added in 60 ml distilled water and stirred for 15 minutes on magnetic stirrer at room temperature. Then, while the mixing process continued, ammonia solution was added to this solution and the pH was adjusted to 10 and it was mixed in a magnetic stirrer for 15 minutes. The final solution was poured into a Teflon linked autoclave and placed in the hydrothermal reactor. Hydrothermal synthesis was carried out at 180 °C for 12 h, and after reaching room temperature, the precipitated particles were filtered off. The particles were dried in the oven at 100 ° C and then they were annealed at 600 °C for 2 hours. After the particles were grounded in mortar, they were analyzed by FE-SEM, EDS and XRD. It was produced in the same way in Sr doped NiO particles, except that 1% and 4% molar ratios of Strontium nitrate were added to the solution. The synthesized particles are nano-sized and transformed from a nano-plate-like form to a spherical-like form with the addition of Sr. Characteristic peaks of NiO were found in XRD analysis and these peaks belong to the (111), (200), (220), (311) and (222) planes. XRD peak intensities increased with the increase of the Sr doping ratio and the structures of Sr were not found in XRD analysis. This indicates that Sr is successfully doped to NiO. As the Sr contribution increased, the ratio of Sr in NiO nanoparticles increased as expected.

Keywords: Semiconductor Metal Oxide, Nio, Strontium, Hydrothermal, Nanomaterial.

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THE EFFECT OF RANDOMLY DISTRIBUTED DISCRETE FIBER ON SHEAR BAND FORMATION OF CLEAN SAND SOIL

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Abstract:

In order for soils to acquire the properties suitable for their intended use, various stabilization methods are used. In these methods, which are applied on two different principles, admixture and non-admixture, it is aimed to improve engineering the properties of the soils as a result of the rehabilitation of their properties such as bearing capacity, settlement, permeability etc. One of the most important polymeric materials used for this purpose in admixture principle is fiber reinforcements. Along with their high alkali resistance and long-term durability (corrosion free), fiber reinforcements are geosynthetics having properties of high strength, high modulus of elasticity, and ductility. Literature studies have shown that fiber reinforcement has significantly affected the strength and deformation properties of sand soil depending on various factors (grain properties, effective pressure, test type, etc.). In this study, the effect of the fiber reinforcement to the shear band formation, which is one of the most important factors in understanding the failure mechanisms of soil, is investigated. It further increased the importance of this study that previous studies on the shear band formation are generally for the plane strain method and that the effect of the fiber reinforcement on this formation has not been investigated enough (because it contributes to the shortcomings in this area). In this study, a total of 24 samples, prepared with moist tamping (Wopt= 11%) method as fiber reinforced (12 samples) and unreinforced (12 samples), were tested with triaxial shear method under drained conditions with deformation control. In the test samples, while CEN standard sand (D50 = 0.70 mm, Cu = 6.5, Cu = 2.04, emin = 0.46, emax = 0.69, Gs = 2.64) was used as clean sand material, FUSIONTM synthetic macrofibre (Polyolefin, σt = 448 MPa, Ef = 6.2 GPa, Gs = 0.91) was used as the randomly distributed material in the sand matrix. In the study, in which the fiber concentration (wf = Wf / Ws = 0.5%) and aspect ratio (λ = 30) were kept constant, relative densities were chosen 40%, 65%, and 90%, confining pressures 30 kPa, 100 kPa, and 200 kPa, and axial constant strain rate 0.02%/min. In the evaluation of the test results, various theoretical expressions which take into account the common effect of the parameters such as shear strength angle and/or dilation angle, and observations were used. As a result of the study, it was observed that fiber reinforcement as well as relative density and confining pressure are effective in shear band formation. This effect is that the fiber reinforcement increases the number of shear band while reducing the shear band thickness as a common function of density and confining pressure. On the other hand, it is observed that current theoretical expressions used in estimating the shear band angle are not sufficient for the fiber-reinforced grained soils, and it is predicted that using these expressions with an additional term that includes the effect of fiber reinforcement will be useful in obtaining more accurate results.

Keywords: Shear Banding; Soil Improvement; Fiber Reinforced Sand; Instability; Triaxial Shear Test.

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THE BINDING ENERGY OF HYDROGENIC SHALLOW-DONOR IMPURITY IN AN ANHARMONIC QUANTUM WELL: ROLE OF APPLIED EXTERNAL ELECTRIC AND MAGNETIC FIELD

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Abstract:

The combined effects of the static electric and magnetic fields on the binding energy of hydrogenic shallow-donor impurity states in an anharmonic GaAs quantum well have been calculated using a variational procedure within the framework effective-mass and parabolic-band approximations. The numerical results have been obtained for shallow-donor impurity positions and applied external static electric and magnetic fields. Our numerical results suggest that external inputs such us static electric and magnetic fields are two useful tools in order to modify the binding energy of a donor impurity in an anharmonic GaAs quantum well.

Keywords: Anharmonic Gaas Quantum Well, Binding Energy, Donor Impurity.

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A NOVEL METHOD FOR SEGMENTATION OF BENTHIC FORAMINIFERA INNER MORPHOLOGY ON THE THIN SECTION PHOTOS

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Abstract:

Microfossil studies are one of the most important tools revealing history of Earth's formation due to they provide data such as age of formation of rock and the ocean water temperature, salinity and carbonate content of that period by examining samples from rock. Until today, the defination of microfossils samples is done by paleontologists with huge effort using traditional methods. With today's developing image processing technology, it is possible to shorten and facilitate the fossil defination process and increase reliability of study. While there are studies in literature on taking fossil photographs with electron microscopy, no image processing technique has been found in thin-section photographs. For fossil identification process, the first step should be determination of fossils inner morphology which are among distinguishing features of fossils. Successful segmentation will be the most important step that strengthens basis of breed identification stage. In this study, a novel method is proposed for segmentation of chambers of benthic foraminifera. Proposed method is according to the order of processing with background saving, rgb2gray processing, noise reduction, Otsu method, background masking and morphological operators. For proof of success, method tests were carried out on sufficient benthic foraminiferal specimens; Photographs of Cornuspira, Deckerella, Endotriadella, Tauridia, Turriglomina genus from Mesozoic Era samples. Especially the fossils here were selected from specimens where they were buried for a long time and therefore difficult to identify. As a result of tests, it was seen that the proposed method clearly recognized fossil chambers in terms of their morphological features. Successful results were obtained in segmentation process from the thin section samples. Therefore, thanks to this study, a method has been proposed that will give great impetus to fossil identification studies. In future, new fossil data set will be created and used for machine learning- based classification.

Keywords: Paleontology, Microfossil, Foraminifera, Chamber, Image Processing, Segmentation

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TOWARDS HIGH PRECISION SATELLITE BASED REAL TIME POSITIONING WITH TRIMBLE RTX SERVICE

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Abstract:

The real time precise positioning methods with Global Navigation Satellite Systems (GNSS) have been drastically enhanced in recent. The Real Time Precise Point positioning (RT-PPP) method has become available in the last years along with the commonly used relative techniques; Real Time Kinematic (RTK) and Network RTK (NRTK). In addition, Trimble introduced the RT-PPP correction service called Real Time eXtended (RTX), which delivers the correction data via L-band signals of geostationary orbit (GEO) satellites. In this study, a field test was carried out to assess the latest performance of the Trimble RTX service considering the combination of GNSSs namely, GPS-only, GPS+GLONASS, GPS+Galileo, GPS+GLONASS+Galileo, GPS+GLONASS+Galileo+Beidou. The RTX coordinates of five satellite configurations were retrieved for 9-hour, in November 2020. The results of the experiments were evaluated in terms of repeatability. The standard deviation of GPS+GLONASS combination is better than 2.0 cm in both horizontal and vertical components. Moreover, the GPS+GLONASS+Galileo combination improved the precision of GPS-only by 33.2% for the vertical component.

Keywords: Gnss, Rt-Ppp, Trimble Rtx

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