TMREES23

Euraca - FuturoVerde - Edicientí

08 to 10 March, 2023. Metz, Grand-Est, France.

Abstracts book

Submission index: [114], [258], [345], [400], [418], [517], [530], [565], [666], [710], [743], [761], [910], [1129], [1287], [1348], [1457], [1508], [1533], [1557], [1565], [1587], [1600], [1605], [1617], [1641], [1642], [1666], [1694], [1750], [1868], [1913], [1915], [2001], [2190], [2419], [2658], [2738], [2845], [2848], [2870], [2872], [2883], [2904], [2920], [2934], [3021], [3087], [3114], [3155], [3205], [3280], [3609], [3651], [3862], [3951], [4085], [4153], [4183], [4230], [4358], [4470], [4513], [4522], [4596], [4616], [4855], [5036], [5054], [5107], [5111], [5118], [5272], [5355], [5511], [5658], [5819], [5952], [6060], [6064], [6164], [6286], [6408], [6435], [6519], [6522], [6524], [6559], [6858], [6946], [6997], [7101], [7209], [7272], [7291], [7319], [7341], [7406], [7477], [7478], [7596], [7679], [7781], [7835], [7863], [7951], [7962], [7984], [8087], [8143], [8415], [8424], [8581], [8814], [8828], [8839], [8874], [8905], [9243], [9497], [9837], [9959]

[114] *Air Flow Distribution and Cooling Performance on Solar-powered Cold Storage for Fishery Commodity*

Muhammad Arif Budiyanto (Universitas Indonesia), Oktandio Imamudien (Universitas Indonesia), Arnas Lubis (Universitas Indonesia), Muhammad Idrus Alhamid (Universitas Indonesia), Agus Sunjarianto Pamitran (Universitas Indonesia) and Muhammad Iqbal (University of Strathclyde).

Cold storage plays an important role in the supply chain of fishery products. Efficient cold storage design is a future challenge for developing regions with limited energy supplies. The aim of this paper is to perform an analysis of the cooling performance and airflow distribution of solar-powered cold storage. Solar-powered cold storage is designed with a size of 20 feet for remote areas with the main cargo of fishery products. The analysis was carried out using empirical equations and numerical simulations of fluid flow and heat transfer. Variation of cooling load and inlet air velocity was conducted to investigate the cargo's cooling distribution and cooling speed. The results of the analysis show that the optimum inlet air velocity setting is 4 m/s providing an even distribution of cold air throughout the room. Furthermore, the results of this paper also provide recommendations for pre-cooling fish products to minimize excessive cooling in air-blast freezers.

[258] *Improving fuel quality from plastic bag waste pyrolysis by controlling condensation temperature*

Nattadon Pannucharoenwong (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Keyoon Duanguppama (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand), Snunkhaem Echaroj (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Chinnapat Turakarn (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand), Kumpanat Chaiphet (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand) and Phadungsak Rattanadecho (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand).

Improving fuel quality from plastic bag waste pyrolysis by controlling condensation temperature. This objective was to study the first condenser temperature in 5 levels: 10°C, 20°C, 30°C, 40°C and 50°C. The experimental conditions were pyrolysis temperature of 300°C, hot filter temperature of 200°C, second condenser temperature of -40°C, 1 kg of plastic bag waste and the experimental period of 2 hours. The results showed that the first condenser temperature of 30°C yielded the highest first fuel yield of 70.7 wt%. When raising the temperature to 40 °C, the second fuel yield was up to 7.3 wt%. The results of the fuel properties analysis revealed that the first fuel had a high heating value (HHV) of 42.4 MJ/kg. There is a chemical composition of substances in the diesel fuel group mostly. But, the first condenser temperature increased from 10°C to 50°C, causing a decrease in calorific value and density. This is a result of chemical compositions where many macromolecules are condensed in the fuel. For the analysis of the second fuel, it was found that the HHV was 38.1 MJ/kg, which was 4.3 MJ/kg lower than the HHV of the first fuel. However, the calorific value and density of the second fuel increases as the temperature of the first condenser increases. The chemical composition of the second fuels is Benzene, Toluene and Cyclononane as its main constituents, giving it a physical appearance like that of gasoline. But, in second fuels there is a chemical composition of Dicyclopentadiene. It has a clear yellow color and a pungent odor that annoys users. If in the future this substance can be eliminated, it will enable the production of fuel from plastic waste as a substitute for gasoline.

---

[345] *Anaerobic Digestion of Greengrocery Wastes at Different Particle Size and BMP estimation*

Sara Selli (DAFNE, University of Tuscia), Stefano Morelli (DAFNE, University of Tuscia), Danilo Monarca (DAFNE, University of Tuscia) and Maurizio Carlini (DEIm, University of Tuscia).

The growing importance of the circular economy approach to the resources' employment and the needing of energy production from renewable sources have increased the importance of the analysis and optimization of biomass-to-energy conversion processes. This work aims to define the biomethane potential (BMP) of residual vegetables and fruit wastes (VFW) from anaerobic digestion processes carried out in laboratorial scale batch reactors. In order to provide more information about the sensitivity of biomethane production to the dimension of the particles of wastes in the reactors, three sizes of biomass have been experimented: particles with maximum dimension equal to 1.70 cm, particles with a dimension in the range between 1.70 cm and 0.85 cm, and particles with a dimension minor than 0.85 cm. Data collected about the biomethane cumulate production have been studied using ANOVA (Analysis of Variance). For this specific substrate and particle size used, in the operating conditions in which batch anaerobic digestion has been carried out, the influence of particle size has been considered neglectable on the biomethane production (using an α=0.05 and not calculating the value of the second type error β). The obtained biomethane potential is equal to 0.380 Nl/gSV±4% at the 12th day of test. At day 13 of test a laboratorial failure occurred and lasted for about seven days. Then the tests have been restored but these data are not suitable for the BMP calculation. However, these last production trends have been analysed in order to collect more information about the behaviour of each substrate after the failure.

---

[400] *Waste Water Heat Recovery Systems Types and Applications: Comprehensive Review, Critical Analysis, and Potential Recommendations*

Zahra Wehbi (Lebanese International University), Rani Taher (American University of the Middle East), Jalal Faraj (The International University of Beirut), Thierry Lemenand (University of Angers) and Mahmoud Khaled (The International University of Beirut).

Reducing energy consumption can be considered as one of the most efficient strategies to overcome the consequences of the present energy crisis. With this in mind, energy recovery could offer a valuable solution to reduce energy bills. It consists in utilizing the lost heat from any engineering system in a useful application. That said, waste water is a rich source of waste energy, that if recovered, can greatly decrease electrical consumption. In the frame of this view, the present paper offers a comprehensive review on waste water heat recovery systems (WWHRS)s in terms of applications and performance. Furthermore, the paper discusses the main aspects related to WWHRS such as: the sources of wastewater and the techniques adopted to approach waste water heat recovery in the literature. Notwithstanding, the paper discusses the main social, economic and technical barriers of using (WWHRS)s.

---

[418] *Overview and possible approach to street sweeping criticalities*

Marco Ragazzi (University of Trento), Carlo Zuccato (University of Trento), Marco Schiavon (University of Padua) and Elena Cristina Rada (University of Insubria).

In order to highlight the complexity in planning street sweeping in urban areas, an example is given based on the collection of the number of passages of sweeping vehicles during an observation period of one year. Data refer to a district of a European city whose street sweeping service was kept under monitoring with the aid of a software tracking

sweeping vehicles and other operational parameters. The monitoring campaign pointed out the issues occurring during sweeping operations and the available margins of improvements. Two methodologies for optimization were proposed: a theoretical-analytical approach based on the attribution of weights to street characteristics and a hybrid approach, initially based on a previous experience in an urban area and later refined with the continuous analysis of data collected during sweeping operations. The present article shows that the second approach is the easier to adopt and allows for a flexible calibration of sweeping operations.

---

[517] *Development of QSRR model of a set of Polycyclic Aromatic Hydrocarbons using simple regression analysis.*

Nadia Ziani (Department of Chemistry, Faculty of Science, Badji Mokhtar University Annaba, BP 12, Annaba, 23000, Algeria.), Khadidja Amirat (Department of Chemistry, University of Sétif 1 , Ferhat Abbas,El Bez, Setif, 19000, Algeria), Souhaila Menaceur (Process Engineering Department, Hamma Lakhdar University of El-Oued, Algeria.) and Fatiha Mebarki (Material Sciences Department, University of Tamanrasset, Algeria).

. A structure /retention indices relationship was searched for 59 PAHs while promoting the hybrid genetic algorithm/simple linear regression approach, the structural parameters being calculated with the software Spartan and DRAGON. Among about a hundred of one regressor models gotten, we selected the one that present best values of the prediction parameter (Q2) and of the determination coefficient (R2).the reliability of the proposed model was further illustrated using various evaluation techniques: leave-many-out, cross-validation procedure, randomization test, and validation through the test set.

---

[530] *Adsorption of Recalcitrant Malachite Green Dye from Aqueous Solution Using Cabbage Waste powder*

Joan N. Wekoye (University of Kabianga), Wycliffe C. Wanyonyi (University of Kabianga) and Phanice T. Wangila (University of Kabianga).

Malachite green (MG) dye is a cationic, azo soluble organic dye blamed for grievous health complications and aquatic pollution. The present work exploit cabbage waste powder (CWP) in the adsorptive removal of Malachite green dye from aqueous solution. Results from batch experiments demonstrated that sorption process heavily depended on time of contact, size of particles, temperature, pH and dye concentration. The equilibrium adsorption was realized within 80 minutes with adsorption efficiency of 92.5% at pH 8. The percentage dye removal improved with rise in time of contact, adsorbent dose and surface area to volume ratio but declined with rise in temperature. FTIR analysis established numerous functional groups of lignocellulosic compounds on adsorbent, which greatly influenced dye removal. The sorption kinetics obeyed pseudo-second order kinetic model while the equilibrium data followed Freundlich isotherm model. These results prove that the cabbage waste powder is indeed a worthwhile, overabundant and environmentally safe biosorbent for adsorptive removal of dyes from textile wastewaters.

---

[565] *Computational fluid dynamics approach for energy savings evaluation in core annular flow of a horizontal T-pipe*

Cindy Dianita (Chulalongkorn University), Ratchanon Piemjaiswang (Chulalongkorn University) and Benjapon Chalermsinsuwan (Chulalongkorn University).

The application of core annular flow (CAF) has become an interesting solution in transporting heavy oil through pipeline because of its energy reduction and cost efficiency. At the same time, the CAF in pipe with hydraulic fittings and the problem of unstable CAF are the part of some big issues in using CAF techniques. This study intended to investigate the energy saving of CAF in horizontal T-pipe with symmetrical flow and diameter of 50 mm for oil and water system using CFD approach. Pressure reduction and power consumption were computed as the parameters to measure the energy saving of the flow system. The result of this study showed significant energy reduction of CAF with 94% of pressure drop reduction, for transporting the same amount of oil, when comparing to the traditional single phase oil flow. On the other hand, the intersection of the T-pipe was considered as critical region that promoting the change of flow direction and disturbing the existing CAF pattern. Thus, this study also proposed the strategy for returning the CAF during the process of oil transportation without stopping or restarting the flow operation. The geometry of the T-pipe was modified to facilitate the additional water injection at the intersection as a strategy to get back the CAF pattern. Consequently, the modified T-pipe with certain velocity of additional water injection was recorded to give important improvement of CAF application in terms of more stable CAF and higher pressure drop reduction (98%) compared to oil transportation without lubrication. This study also recorded the values of power reduction factor that indicating the cost of power consumption to transport the oil could be saved more than 80% than single phase oil transportation.

[666] *WIND POWER PLANT WITH LOW-POTENTIAL WIND ENERGY STORAGE IN CONDITIONS OF A SHORTAGE OF WIND POWER*

Sergei Sodnomovich Dorzhiev (Federal State Budgetary Scientific Institution “Federal Scientific Agroengineering Center VIM”) and Maria Igorevna Rosenblum (Federal State Budgetary Scientific Institution “Federal Scientific Agroengineering Center VIM”).

Agricultural lands are mainly located in areas with low average periodic wind speeds, and, furthermore, far awayfrom the power grid.Such facilities can be powered by wind energy using small wind power plants up to 20 kW. The operation of wind power plants with different parameters was studied in the range of wind speeds of 3-14m/s.At low wind speeds of up to 7 m/s, wind power plants with direct connection to the generator virtually do not operate.The annual capacity factor in regions with an average periodic speed of 4-6 m/s is no more than 10%.To increase the capacity factor, it is proposed to store low-potential wind energy up to 7 m/s and use it during windless periods.Literature sources analyzed, as well as studies conducted in full-scale conditions, have shown that periods of continuous windlessness in the area with an average periodic speed of 4.5 m/s last on average 10-30 minutes.A theoretical analysis of the operation of a wind power plant with a storage unit in conditions of a shortage of wind power has been carried out. The annual output is calculated at average periodic wind speeds of 4,5,6 m/s.To test the hypothesis, a wind power plant with 3 wind rotorswith hydraulic transmission to transfer energy to a generator and a pumped storage unit tostore low-potential wind energy has been developed.Experimental studies were carried out from July 1, 2022 to September 1, 2022 in the area with an average periodic wind speed of 4.5 m/s.Power readings were taken every 10 minutes using a wattmeter.The research results showed that the capacity factor per month of a wind power plant with a storage unit is 30% more than the capacity factor of a wind power plant with a direct connection to the generator.

---

[710] *The impact of Electricity Production on Environmental Quality. The role of Institutional Quality in Ghana.*

Emmanuel Kwakye Amoah (Regentropfen College of Applied Sciences), Foster Awindolla Asaki (Regentropfen College of Applied Sciences) and Mac Junior Abeka (University of Cape Coast).

The paper investigates the role of institutional quality in the relationship between electricity production and environmental quality. The study used annual data spanning from 1995 to 2021 and the autoregressive distributive lag model (ARDL) as a method of estimation. The findings revealed that electricity production, both in the short and long run, negatively affects environmental quality. Institutional quality in both the short and long run improves environmental quality but the effect was insignificant in both cases. The study thus recommends that policymakers strengthen the various institutions to ensure that electricity production improves environmental quality.

---

[743] *Contribution of renewable energy (wind, solar, biomass and hydro) to decarbonization and transformation of the electricity generation sector for sustainable development*

Simona Lizica Paraschiv ("Dunarea de Jos" University of Galati) and Spiru Paraschiv (University of Galati).

Decarbonization of the energy sector to mitigate the consequences of climate change is possible by incorporating a greater share of electricity from renewable sources and thus reducing the share of fossil fuels in the energy mix, improving energy efficiency in general and increasing energy storage capacities. Renewable energies are increasingly permeating energy systems, causing significant shifts in the energy production mix. The success of transforming the electricity mix is dependent on the variability of renewable energy sources such as solar photovoltaic, wind, and hydro. The share of these renewable sources in Romania's energy mix was calculated using actual electricity generation and consumption data from 2019. Current electricity consumption has largely exceeded electricity generated from renewable sources. The production of electricity from renewable sources (hydro, solar photovoltaic, wind, and biomass) covered 39.86% of total electricity consumption.

---

[761] *Energy efficient self-driving strategy for lead vehicle following with road slopes based on learning predictive control*

Kiwon Yeom (Sangmyung University).

of energy consumption. Especially, technical advance of self-driving technology progressively plays an important role in prompting energy efficient control of electric vehicles (EVs) due to the limited capacity of battery. In this research, a learning predictive control strategy is introduced for reducing primary energy consumption during self-driving of EVs. This article is used to model predictive control architecture is combined to find the optimal solution of the control problem

which is to maximize energy efficiency in a certain interval, where the computed cost of the given interval is fed into the deep reinforcement learning networks (DRL) as the state value. Thus, the terminal cost value control conditions are constrained in the precedent state. The proposed algorithm was tested in the virtual simulation environment (CarSim) and the simulation results show the efficiency of energy consumption.

---

[910] *The concept of ensuring the flexibility of local intelligent energy systems with renewable energy sources*

Evgeniy Boyko (Energy Research Institute of the Russian Academy of Sciences (ERI RAS)), Felix Byk (Novosibirsk State Technical University), Pavel Ilyushin (Energy Research Institute of the Russian Academy of Sciences (ERI RAS)), Ludmila Myshkina (Novosibirsk State Technical University) and Konstantin Suslov (Irkutsk National Research Technical University).

In certain technical or economic conditions, balanced local intelligent energy systems (LIES) are created. Their essence is such that, in the general case, electricity and heat supply is carried out from a mini-CHP, as an energy-efficient source of energy. Controlled power plants operating on hydrocarbon fuels make it possible to provide the required level of balance and regime reliability of power supply. The structure and composition of the mini-CHP equipment are determined not only by the ratio of the needs for thermal and electrical power, but also by the availability of energy sources in the LIES. Such energy sources operate on renewable energy sources (RES) and energy storage systems (ESS), their need is due to ESG-standards. The subject of the article is the influence of RES and ESS on the structure, composition and mode of operation of generating equipment in LIES. And the objects are areas where, according to climatic conditions, the need for heat exceeds the demand for electricity. Such areas exist in the North and Far East of Russia, where the power supply of settlements is carried out without connection with the Unified Energy System of Russia, as well as in the conditions of Western and Eastern Siberia, where there is such a connection, but they are characterized by the availability of natural gas. In the first case, RES and ESS make it possible to reduce the consumption of a scarce energy resource, and in the second case, to obtain significant beneficial systemic effects. The main result is the determination of the composition and size of these effects obtained with the optimal combination of controlled and stochastic generation in hybrid LIES.

[1129] *Design Of a Hybrid Renewable Energy System for a Reverse Osmosis Desalination Plant: Case Study of Abuqir-Egypt*

Ahmed Awad (Mechanical Engineering Department, College of Engineering and Technology, AAST Alexandria, Egypt) and Ahmed S. Shehata (Marine and Offshore Engineering Department College of Engineering and Technology, AASTMT Alexandria, Egypt).

A preliminary design for a Hybrid Renewable Energy Source (HRES) system to satisfy electrical load demand of a proposed Reverse Osmosis (RO) seawater desalination plant in Abuqir, Alexandria, Egypt. The design uses HOMER PRO™ software, which analyzes user-provided data to optimize and simulate the system. Fresh water consumption data was obtained and processed to match Abuqir' s demand. The proposed HRES-RO plant will use solar and wind energies equally. The results shown that the design is initially feasible with a projected COE OF $0.158/kWh .

[1287] *OPTIMIZATION OF A NON-LINEAR SUSPENSION QUARTER CAR USING GENETIC ALGORITHM*

Mahmoud Salem (Arab Academy for Science, Technology & Maritime Transport), Ahmed Taha (Arab Academy for Science, Technology & Maritime Transport) and Mina Atta (Arab Academy for Science, Technology & Maritime Transport).

This paper investigates the effect of the attachment of a nonlinear stiffness spring in a quarter car model under various road conditions. To obtain a high level of ride comfort and improved vehicle handling under all driving conditions it is necessary to design a good suspension. An important criterion for optimal ride comfort is the root mean square of the absolute acceleration specified by British standards ISO 2631-1. A new way to reduce vibrations is to utilize nonlinear components. The realization of vibration reduction through one-way irreversible nonlinear energy localization which requires no pre-tuning in quarter car models is studied for the first time. The mathematical model of the quarter-car is derived and the dynamics are evaluated in terms of the main mass displacement and handling effect. The simulation of the car dynamics is performed using Matlab® and Simulink®. Results show that the addition of the nonlinear stiffness decreases the vibration of the passenger to meet optimal ride comfort standards and handling. The design of the proposed nonlinear spring is investigated and the simulated results are verified. The future of the technology is in the use of a nonlinear suspension that could provide improvement in performance over that realized by the passive, semi active and active suspension. This paper applies the genetic algorithm on a nonlinear stiffness spring in a quarter car model

under different parameters. Varying the speed and the sprung masses are the variables changed, in order to study their effect on the displacement of the sprung mass. Validation of the experimental set up with the simulated model is performed to ensure optimum parameter identification. Results show that genetic algorithm parameters decreases the vibration of the passenger in the theoretical model and obtains the minimal vibration attainable.

[1348] *Environmental and economic aspects of the gas lift method of oil production*

Irina Filimonova (Trofimuk Institute of Petroleum Geology and Geophysics SB RAS), Irina Provornaya (Trofimuk Institute of Petroleum Geology and Geophysics SB RAS), Anna Komarova (Trofimuk Institute of Petroleum Geology and Geophysics SB RAS), Alexander Novikov (Trofimuk Institute of Petroleum Geology and Geophysics SB RAS) and Kseniya Ryaguzova (NSU).

The extraction of the energy sources such as fossil fuels is accompanied by the various environmental challenges. Modern developments in the extraction methods are aimed at the risk mitigation as well as rise of economic efficiency. The relevance of the development of the gas lift method of oil production is related to the environmental issues, in particular, the utilization of associated petroleum gas. The advantage of this method is the possibility of application in fields with low reservoir pressure, as well as for oil with a high content of impurities, including sand, paraffin, salts and sulfur. The authors have developed a technical and economic model for the comparison of the efficiency of using mechanized methods of oil production such as electrical submersible pump and gas lift. The model consists of five blocks (resource, technical, financial, economic and resulting), each is accompanied by mathematical modeling of the main processes. The results of the study, obtained on the example of the Orenburg oil, gas and condensate field, showed that the use of the gas lift method of production compared to the electrical submersible pump provides savings in capital investments by 13% and an increase in operating costs by 4%, at the same time, an increase in net present value by 35% is achieved. For this field, it is advisable to use a non-compressor gas lift, due to the possibility of the extraction of the associated gas from a neighboring field. Sensitivity analysis revealed a low degree of risk of using the gas lift method of oil production in the Orenburg field.

[1457] *Evaluation of high-tensile steel using nonlinear analysis: Experiment-FE materials benchmarking of LNG carrier structures under low-temperature conditions*

Suryanto Suryanto (Universitas Sebelas Maret), Aditya Rio Prabowo (Universitas Sebelas Maret), Teguh Muttaqie (National Research and Innovation Agency (BRIN)), Iwan Istanto (Polytechnic Institute of Nuclear Technology), Ristiyanto Adiputra (National Research and Innovation Agency (BRIN)), Nurul Muhayat (Universitas Sebelas Maret), Aprianur Fajri (Universitas Sebelas Maret), Sören Ehlers (Technical University of Hamburg) and Moritz Braun (German Aerospace Centre (DLR)).

Natural gas is the cleanest energy source compared to other fossil fuels. When the temperature is between -160 ºC to -164 ºC at atmospheric pressure, natural gas will be in liquid form, commonly called Liquefied Natural Gas (LNG). Currently, the demand for the availability of natural gas is increasing rapidly. However, not all countries have natural gas reserves. In this case, ships transport Liquefied Natural Gas (LNG) between continents and oceans to meet global needs. Since the Northern Sea Route (NSR) was opened, the route has become an alternative route where ships can save fuel because the distance is closer than the standard route (through the Suez Canal). However, because this route is in the Arctic region, which has a harsh environment, the ship may experience a structural failure, resulting in an accident and possibly causing material, human or other casualties. This paper uses the finite element method to observe the materials used as raw materials for the structure of natural gas shipping vessels. High tensile steel grade AH 32 is tested for tensile using numerical analysis. The temperature varies from room to shallow temperature (-160 ºC). Besides that, the mesh sizes used were 1 mm, 2 mm, 4 mm, 6 mm, 8 mm, and 10 mm to obtain the results that best match the results of previous studies examined through experimental tests. The result obtained is that the mechanical properties of AH 32 steel will change significantly at shallow temperatures, which can be observed from the engineering stress-strain graph. High tensile steel grade AH 32 becomes very brittle at -160 ºC. Besides that, the necking phenomenon, as in the experimental test, can also be observed through numerical analysis.

[1508] *Investigation of Electromagnetic Behavior in Synchronous Machine: A Review*

Nikolaos Soultanos (University of West Attica), Petros Karaisas (University of West Attica) and Olympiada Syggeridou (University of West Attica).

This paper present a study of electromagnetic behavior in synchronous machine, focusing to the main types of rotor, with several different cases based on scientific papers. More specifically, scientific studies are presented with the object of salient pole and cylindrical rotor (non salient pole) synchronous machine on electromagnetic behavior, standards, design,

modeling, calculation and measurement methods, parameters and control of synchronous machine as well as experimental procedures. This specific paper, was carried out after evaluating the research process, based on scientific studies.

[1533] *Effect of Solvents on Performance of Alq3/ZnO Solar Cells: A Theoretical Approach*

Taif Al Maadhede (Al Turath University college), Mohammad Jumali (School of Applied Physics, Faculty of Science and Technology, UKM, 43600, Selangor, Malaysia.), Hadi Al-Agealy (College of Education Pure Science (Ibn Al-Haitham) University of Baghdad,Iraq), Chi Yap (School of Applied Physics, Faculty of Science and Technology, UKM, 43600, Selangor, Malaysia.), Ammar Ayada (Al Farahidi University, Baghdad, Iraq.) and Auday Shaban (College of Science, University of Baghdad, Iraq).

Successfully, theoretical equations were established to study the effect of solvent polarities on the electron current density, fill factor and efficiencies of Tris (8-hydroxy) quinoline aluminium (Alq3)/ ZnO solar cells. Three different solvents studied in this theoretical works, namely 1-propanol, ethanol and acetonitrile. The quantum model of transition energy in donor–acceptor system was used to derive a current formula. After that, it has been used to calculate the fill factor and the efficiency of the solar cell. The calculations indicated that the efficiency of the solar cell is influenced by the polarity of solvents. The best performance was for the solar cell based on acetonitrile as a solvent with electron current density of (5.078-12.331) mA/cm^2 between (1-6) V. In addition, the highest efficiency calculated for the (Alq3)/ ZnO solar cell was 2.593% which corresponds to the highest current density. However, the calculated fill-factor values were significantly unchanged with the changing of the current density. Interestingly, the measured values are in a good agreement with previously reported experimental values.

[1557] *Long-term Outdoor Performance and Degradation Evaluation of CIS PV Plant under the Semi-Arid Climate of Benguerir Morocco*

Said Elhamaoui (Green Energy Park , IESI Laboratory, ENSET Mohammedia, Hassan II University of Casablanca, Morocco), Aboubakr Benazzouz (Green Energy Park), Abderrazak Elamim (Green Energy Park), Abdellatif Ghennioui (Green Energy Park), Ibtihal Ait Abdelmoula (Green Energy Park) and Mohamed El Khaili (IESI Laboratory, ENSET Mohammedia, Hassan II University of Casablanca, Morocco).

The rapid depletion of world reserves of fossil fuels escalates energy costs, raises concerns regarding energy supplies, and increases climate impacts. Photovoltaic (PV) systems are clean, reliable, and potentially contribute to green energy generation. The performance of a solar photovoltaic process is influenced by location-specific criteria such as latitude, seasonality, irradiance, clearness index, and so forth. Over the last few years, performance and degradation evaluation studies for PV technologies have been done in diverse geographical locations with diverse climatic conditions in accordance with IEA requirements (IEC 61724). A comprehensive study of PV systems utilizing multiple technologies might serve operators and stakeholders with statistically significant results for estimating the performance of such systems. As a result, long-term and short-term performance and feasibility sur may give insight into the characterization of next-generation PV panels. The objective of this study is to establish an outdoor performance evaluation and analysis of a 10.44 kWp grid-connected photovoltaic (PV) system composed of copper indium selenium (CIS) modules, this work aims to study how a (CIS) PV plant performs and degrades in Morocco's semi-arid climate. The study is performed in the period between 2018 and 2021. The measured and estimated performance indicators are evaluated with the aim of assessing the technology's adaptability and degradation; the methodology applied comprises performance evaluations of these PV systems in line with IEC standard 61724. After 6 years of outdoor exposure, the CIS system's output power declined with a degradation rate of 3.13%/year obtained using linear regression. I-V curve measurements performed in RTC determined that power output degradation reached -21.6%, which was more observable in Isc.

[1565] *Assessment of the Withstand Ability to Short Circuit of Inner Windings in Power Transformers Considering the Cumulative Effect*

Hao Liu (Shaanxi Normal University), Fan Zhang (Xi'an Jiaotong University), Shengchang Ji (Xi'an Jiaotong University) and Jisheng Li (Shaanxi Normal University).

After transformers have been subjected to multiple short-circuit shocks, the support stiffness of the winding spars changes under repeated forces, which in turn causes changes in Withstand Ability to Short Circuits (WASC). In this paper, an analytical model of the transformer leakage magnetic field was developed and its validity was verified. Secondly, the effects of short-circuit shocks on the conductors and braces were explained by building a finite element model of the coils within the transformer winding for simulation. Finally, WASC of a 110 kV transformer was assessed. The results show that the safety factor for bending stresses in the conductor increases and the safety factor for critical loads decreases after

being subjected to a short-circuit shock. The likelihood of flexure in the transformer winding increases. The conclusions can provide an important basis for the evaluating the WASC of transformers.

[1587] *Enhancing Biofuel Pellet Quality using Combined Torrefaction and Co-pelletization Processes of Palm Kernel Shell and Empty Fruit Bunch*

Siaw Sang Chang (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang), Noor Asma Fazli Abdul Samad (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang) and Suriyati Saleh (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang).

Palm kernel shell (PKS) and empty fruit bunch (EFB) are potential biomass resources to produce solid biofuel for energy application. However, raw EFB and PKS are not uniform in size and pose rotting behaviour. Torrefaction and co-pelletization are both effective methods to improve their combustion and mechanical characteristics. This study aims to investigate the effect of torrefaction temperature and blending ratio of EFB on mechanical and combustion characteristics of PKS pellets. PKS and EFB were torrefied for 30 minutes at three different temperatures (210°C, 240°C, and 270°C). Then, both torrefied PKS and EFB were blended at five different ratios (0:100, 25:75, 50:50, 75:25, 100:0) with carboxymethyl cellulose as a binder (10% by weight). The result showed that higher torrefaction temperature resulted in increment of higher heating value (HHV) but weaker mechanical strength. Pellet with blending ratio of PKS to EFB (75:25) torrefied at 240°C showed comparatively best pellet quality in terms of HHV (17.94 MJ/kg), high compressive strength (3.5 MPa), low ash content (3.97 wt%) and lowest density changes (0.66%) which satisfy requirement set in standard EN ISO 17255-6 for good quality pellet indicating high quality of biofuel pellet can be produced using combined approach of torrefaction and co-pelletization.

[1600] *Fused Images Based on Division of Hyperspectral Images into Spectral Groups*

Rawnak Abdulwahab (Al-Nahrain University-collage of science), Laith Al-Ani (Physics Dept., College of Science, Al-Nahrain University, Baghdad, Iraq) and Auday Shaban (College of science, University of Baghdad, Baghdad, Iraq.).

Hyper spectral imaging (HSI) can identify various objects by detecting subtle changes in humidity, temperature, and chemical composition due to the abundant and adjacent acquired spectral ranges from visible light (400-1000 nm) to (near) infrared (1000-1700 nm and more). The hyper spectral image spatial resolution is often low due to the limitations of the imaging spectrophotometer, so combining the original hyper spectral image with the image with higher spatial resolution is an effective way to improve the resolution of the hyperspectral image. Three pan sharpening techniques PCA, GS, and NND technique are optimized. In this work, the hyper spectral images have been divided into five groups Blue, Green, Red, NIR, and SIR according to their wavelengths. The PCA technique was applied separately for each group. From 175 hyper spectral images, 23 principal component images from all groups were selected based on the values of the eigenvalues for each group and made ready for fusion with the overall colorimetric image. A comparative study of the three approved techniques was performed using 175 hyper spectral images and with 23 selected principal component images. Four scales were adopted to evaluate the quality of the merged images. The results showed that all quality measures obtained by the proposed method are very good compared to those obtained by applying other image merging methods.

[1605] *Biogas Production to improve the Heavy Fuel Performance by Re-using the Sewage on the Ships.*

Amr Elshouny (Arab Academy - College of Engineering and Technology - Marine & Offshore Engineering Department), Ahmed Samir (Arab Academy - College of Engineering and Technology - Marine & Offshore Engineering Department), Amr Hassan (Arab Academy - College of Engineering and Technology - Marine & Offshore Engineering Department), Yahia Elderany (Arab Academy -College of Engineering and Technology - Mechanical Engineering Department), Miral Michel (Arab Academy - College of Engineering and Technology - Marine & Offshore Engineering Department) and Wesam Mostafa (Arab Academy - College of Engineering and Technology - Marine & Offshore Engineering Department).

The number of ships is increasing day by day which require more fuel and produce more emissions. In addition, petroleum resources are limited in nature and emission standards are being tightened day by day. The IMO has set the target reduce ship CO2 emissions by at least 40% by 2030 compared to levels in 2008. In order to minimize greenhouse gas emissions from ships, EEXI and CII, a series of changes to current laws, have been accepted by IMO. The classification organization has consequently set out to establish emission caps, use EEXI calculation criteria, and mandate that ships implement the essential requirements to comply. Those scenarios are motivating the researcher to find non-petroleum clean energy source, in order to achieve the aforementioned goal, gaseous fuel replenishment is beneficial. In this study,

methane gas supplementation has done to diesel engine. The investigation was carried out to analyze the performance and emission of diesel engine using 0–75% substitution of diesel indicated power by methane energy in dual fuel mode at varying load (25%, 50% and 75%). The results demonstrate that methane energy sharing (MES) lowers brake thermal efficiency (BTE) while unaccounted heat loss increases. For the purpose of determining the non-thermal impact of CH4 on NOx emission, a comparison of NO and NO2 emissions has been given below. Combined reduction in nitrogen oxide and soot emission makes the outcomes of this study more suitable to implement for achieving the strict emission norms. Therefore, CH4 augmentation is advantageous in mid- and high-load circumstances with reduced emissions and energy consumption.

[1617] *THREE-DIMENSIONAL RECONTRACTION OF BUILDINGS BY USING PHOTOGRAMMETRY TECHNIQUES (CLOSE RANGE UAV)*

Mustafa Mahmood (University of Baghdad), Nawal Ghazal (Department of Remote Sensing and GIS, College of Science, University of Baghdad, Baghdad, Iraq) and Faleh Mahmood (Remote sensing Unit, College of Science, University of Baghdad, Baghdad, Iraq).

This article provides an overview of 3D modeling using drones and discusses key concepts and considerations when attempting such a project. Drone technology has made 3D modeling more accessible and faster by using specialized software to create detailed and accurate representations of an object or environment. The article highlights the advantages of using a drone to create 3D models, including eliminating the need for manual measurements and recording. The DJI Phantom 4 drone and its dataset are also discussed, which are commonly used in machine learning and computer vision research for tasks such as object detection and classification. The article also explains the survey method and data acquisition used in the study, which requires the simultaneous presence of a UAV pilot and an assistant operator. The article concludes by discussing the potential applications of drone-based 3D modeling in various industries, such as architecture, land surveying, product design, and virtual reality applications.

[1641] *Floating Solar Panels on Lake Nasser: Clean Energy, Reduce Evaporation & Emissions.*

Mahmoud Ali (AAST), Mohamed Elshaib (College of Engineering and Technology, AASTMT Alexandria, Egypt), Dr. Ahmed Abdelhamid Osman (Arab Academy for Science, Technology and Maritime Transport) and Ahmed S. Shehata (Arab Academy for Science, Technology & Maritime Transport (AASTMT)).

Abstract. This work investigates two problems the Lake Nasser water evaporation and the effect of high temperature on the performance of a photovoltaic solar system. Subsequently, installing floating solar panels over Lake Nasser is the prime resolution. A mathematical model is setup by installing floating solar panels over a part of Lake Nasser represented in unit structure of floating solar station. This model calculates the percentage of evaporation reduction, and the efficiency of the panels due to the effect of water cooling.

[1642] *Analysis of Forest Residues pretreatment using solar photovoltaic*

Matheus Oliveira (Faculty of Engineering of University of Porto), Ana Ramos (INEGI . Porto), Eliseu Monteiro (Faculty of Engineering of University of Porto) and Abel Rouboa (Faculty of Engineering of University of Porto, Porto).

In this work, computational methodologies will be used to simulate the gasification of biomass from agricultural and forest residues assisted by a solar panel, destined to be used in the gasification reaction, because, despite the pre-treatment being efficient when it comes to guaranteeing the increase of contact surfaces and power control, still presents opportunities for improvement, as energy consumption becomes a limiting factor for the process. Energy viability contrasts significantly with economic benefit. In this way, the use of a hybrid PV/T system increases the capacity to use this untapped and necessary energy, the key point, which increases the energy yield bringing more confidence to these renewable energy applications. That is, the energy and heat needed to carry out this stage was provided through an auxiliary system of photovoltaic panels. The simulation process was using Aspen Plus® and TRNSYS. The pretreatment takes place in two stages: milling and drying (food control), which represent a particle size reduction and moisture control below 20% of the biomass feedstock. In this study, 2 compositions of solids of heterogeneous grammometric profiles were used: 50% wood chips (WC) + 50% corn cob (CC) and 50% sugarcane bagasse (SB) + 50% coconut husk (CS). In addition, the relationship between the climatic conditions of the studied location and their effect on the performance of the PV/T collectors. A comparison of the electrical production is also presented, seeking to analyze the effect of the operating temperature of this application. These models were later calibrated and validated with a set of experimental data. The results obtained from the observation are in good agreement with the experimental ones for a set of biomass types and operating conditions.

[1666] *COMPUTATIONAL AND EXPERIMENTAL SIMULATION OF WIND IMPACTS ON A LATTICE STRUCTURE*

Olga Poddaeva (Moscow State University of Civil Engineering) and Anastasia Fedosova (MGSU).

Permeable metal structures are ubiquitous and can be found in everything from temporary installations on construction sites to ultra-high power pylons, oil rigs, wind turbine towers and solar farms. The current regulatory and technical documents consider only individual primitives, from which a complex geometric structure of a structure is formed, but does not provide information on structures of a complex spatial structure. For structures with an increased level of responsibility, aerodynamic coefficients must be set in recommendations developed on the basis of the results of model tests in wind tunnels. In this paper, we propose and test a method for computational and experimental modeling of wind effects on lattice structures. The essence of this technique lies in the combination of experimental modeling of wind effects in wind tunnels and numerical simulation using modern CFD complexes. In the course of the experimental study, due to the design features, weight studies are carried out to determine the integral aerodynamic characteristics. Carrying out drainage tests to determine local aerodynamic characteristics is impossible due to the technical complexity of installing equipment in a permeable structure. At the second stage, in order to determine the local aerodynamic characteristics, numerical simulation is carried out. Verification and validation of the numerical simulation technology is carried out on the basis of the experimentally obtained integral aerodynamic characteristics. Since the object under study is a lattice structure, the requirement to check for resonant vortex excitation does not apply to the structure under consideration as a whole.During the experiment, at all flow velocities, weak vibrations of the object were detected at frequencies corresponding to the natural frequencies of the measuring system. A study was also made of fluctuations in the stall flow behind the model. This study also did not reveal, as in the previous case, the presence of steady-state fluctuations. The given technique allows both to determine the values of the aerodynamic coefficients necessary for calculating the wind load on the structure as a whole, and to assess the possibility of occurrence of vortex resonant excitation

---

[1694] *Heat Transfer Performance of Electronic Devices Cooling System with Elliptical Shape Using Composite Nanofluids*

Kadhim Fadhil Nasir (Al-Furat Al-Awsat Technical University), Haider Al-Hamadani (Al-Furat Al-Awsat Technical University), Mahir Faris Abdullah (Al-Rafidain University College) and Rozli Zulkifli (Universiti Kebangsaan Malaysia).

Numerical analysis was conducted for investigating the heat transfer performance of using pure water and the composite materials nanofluid for cooling through mini-channel heat sink. The numerical analysis includes the numerical simulation of flat coil elliptical channel model by a package ANSYS FLUENT 18 for constant base wall temperatures which is based on the temperature of 330 K and 320 K and the Reynolds number range of 1.5 x 104 to 6.5 x 104. The channels that are employed have an elliptical cross-sectional area with radius of 7 mm (small) and 13 mm (big) for flat coil shape. Channels have been machined on copper block base with 200 mm as width, 50 mm as height, and 70 mm as length. The use of flat coil channel with elliptical shape and hybrid nanofluid contributes to the novelty of the present work. The results of present work showed that heat transfer coefficient of composite nanofluid is greater than that of pure water for two base temperatures by 40.5 and 47% respectively at all Reynolds numbers. The friction factor of composite fluid is greater to which of pure water by 17.94% and 12.86%, respectively. It is found that there is improvement in heat transfer performance of composite nanofluid compared with the results of pure water. The numerical results of present work for Nusselt number and friction factor distribution have been validated with the results from literature and they displayed good agreement with a standard deviation of 7.8 % and 6.4%, respectively.

[1750] *The influence of bioretention assets on the outdoor thermal comfort in the urban area*

Thidarat Kridakorn Na Ayutthaya (Faculty of Engineering, Chiang Mai University), Pathitta Suropan (Faculty of Architecture and Planning, Thammasat University), Chawanat Sundaranaga (City Research and Development Center, Faculty of Engineering, Chiang Mai University), Non Phichetkunbodee (Department of Civil Engineering, National Taiwan University), Rujiroj Anambutr (Faculty of Architecture, Silpakorn University), Pongsakorn Suppakittpaisarn (Faculty of Agriculture, Chiang Mai University) and Damrongsak Rinchumphu (Faculty of Engineering, Chiang Mai University).

The urban heat island (UHI) problem is an essential issue for urban living, especially in urban areas worldwide. The preliminary studies found that rising temperatures are proportional to the city's density and affect human outdoor thermal comfort, which is related to the increasing demand for real estate development, such as the condominium projects located in the city. This research will identify the relationship between outdoor thermal comfort and the bioretention asset to support sustainable city development. Then, this result conducts the outdoor area design guideline for real estate development with nature-based solution responsibility by using bioretention based on the water-sensitive

urban design concept. A preliminary study of the outdoor thermal impacts that affected outdoor thermal comfort and the results will be used as a sustainable guideline for landscape architecture practices in future condominium development in the city.

[1868] *LIFE CYCLE ASSESSMENT OF POWER GENERATION TECHNOLOGIES*

Moses Kabeyi (Durban University of Technology) and Oludolapo Olanrewaju (Durban University of Technology).

This study presents the environmental impacts of power generation technologies based on life-cycle assessments (LCAs). The assessments cover impacts from extraction, processing and transportation of fuels, construction of power plants and power generation. Life-cycle assessment (LCA) to of power generation technologies is very useful as the world seeks ways to meet growing electricity demand with less health and environmental impacts. LCA is an evolving methodology with a number of barriers and challenges but has helped in improving the understanding of the lifecycle energy, greenhouse gas emissions, air pollutant emissions, and water-use implications to power generation. The application of LCA tools facilitate analytically thorough and environmentally holistic approach in assessment and comparison of power generation technologies. Most LCAs show that the best power plants are hydropower, both run-of-river and with reservoir, nuclear energy, and wind power.

[1913] *Reliability of autonomous solar-wind microgrids with battery energy storage system applied in the residential sector*

Eliseo Zarate-Perez (Universidad Privada del Norte (UPN); Universidad Nacional de Educación a Distancia (UNED)), Rafael Sebastián (UNED) and Cesar Santos-Mejia (UNED).

The objective of this study was to evaluate the reliability of a hybrid photovoltaic (PV)/wind microgrid. Specifically, this research focused on identifying the deficit and energy autonomy of the microgrid by considering the variability of short-term solar radiation through a simulation. The data from a residence were collected every 10 s, with the average values occurring every hour and exported for computer processing. Similarly, solar irradiation, wind speed, and temperature data were used. Next, the modeling of the PV panel, wind turbines, battery energy storage system (BESS), management strategy, and energy autonomy are defined. The results indicate that when PV and wind systems work separately, the residential energy deficit cannot be consistently reduced. However, the PV/Wind/BESS configuration improves the operation and can be sufficient to cover the required load in most hours. The public grid supplies power only when the BESS status is insufficient to cover the load. Therefore, the optimal dimensioning of the BESS influences the viability of the system by reducing the initial installation costs, regulating the parameters of the microgrid, and contributing to the reduction of the energy deficit. Accordingly, the basic design parameters of the microgrid and BESS must be investigated to identify the optimal capacity of the system for making the model reliable.

[1915] *Levelized Cost of Electricity in Generation Planning*

Moses Kabeyi (Durban University of Technology) and Oludolapo Olanrewaju (Durban University of Technology).

The Levelized cost of electricity (LCOE) is a techno-economic parameter applied in evaluation of the cost of power or energy produced by a power plant. The costs that are considered are initial cost of the power plant, cost of operation and maintenance and the production cost constitute the main input data for LCOE determination. The LCOE does not account for the interaction of the new power plant hence indirectly assumes the power plant as stand-alone. This study critically reviews the 'Levelized cost of energy' metric and application in electricity project development. Levelized cost is a simple metric hence widely used to compute the unit cost of power generated from power generation technologies. Limitation of the metric includes lack of consideration for key parameters like inflation, power integration costs, and system costs whose integration would provide a more comprehensive metric for evaluating power generation projects, and the entire power system

---

[2001] *The Effect between Combination of cold plasma and gold nano material on blood components*

Ahmed S Obaid (University Of Anbar , College of Science, Department of Physics), Maysaa R Naeemah (Department of Physics, College of Science for Women, University of Baghdad), Noha H Harb (Department of Physics, College of Science for Women, University of Baghdad), Ban Adil (Department of Physics, College of Science for Women, University of Baghdad) and Fatiam F Hasan (Department of Physics, College of Science for Women, University of Baghdad).

A simple low-cost approach at various exposure times was utilized to generate cold plasma in the aim to fabricate AuNPs. UV-Visible spectra and X-ray diffraction were used to characterize the nanoparticles (XRD). Surface Plasmon resonance

was observed in the synthesized AuNPs at 530, 540, and 533 nm. For all samples, the patterns of XRD show very intensive peaks implying the fcc crystalline structure of AuNPs. The average crystallite size of AuNPs is ranging between 20-30 nm. The observation of morphology by FESEM revealed the spherical formation of AuNPs. Doses of 100 and 200 ppm of AuNPs were adapted to investigate their effect on the blood-mixture with and without a 20-second of cold plasma exposure. The WBC components in the blood rose as the AuNPs doses increased, whereas, the amount of (pt) in the blood fell down throughout the two weeks of AuNPs doses for the groups which exposed to AuNPs only, the level of (pt) in the blood increased in the groups which are exposed to AuNPs combined with cold plasma. While the RBC unaffected.

[2190] *Lifecycle Carbon Emissions of Energy Sources*

Moses Kabeyi (Durban University of Technology) and Oludolapo Olanrewaju (Durban University of Technology).

The attainment of decarburization targets and keep the global warming below 2°C threshold requires well-informed energy policy design. Low-carbon electricity supply for all needed to attain the 2°C-compatible energy system, will entail electrification of most of our economy. Life cycle assessment facilitate evaluation of a product over its life cycle, and across various environmental indicators. Technologies assessed include coal, natural gas, hydropower, nuclear power, concentrated solar power (CSP), photovoltaics, and wind power. Life cycle assessment is a tool used to evaluate the environmental impact of energy sources. One major limitation of the standard life cycle assessment methodology is that it ignores the impact of the impact of greenhouse gases. Life-cycle impacts decrease substantially when current fossil fuel technologies diminish in the energy mix particularly coal. Natural gas use may play an important role during the transition while installation of new fossil options without CO2 capture should be avoided to minimize emissions. The endogenous integration of life-cycle indicators into energy models adds value to both life cycle assessment and energy systems modelling in their support in energy decision as well as policy-making for sustainable energy transition

---

[2419] *Experimental research on the performance of a BIPV system operating in Girardot, Colombia*

Sergio Andrés Restrepo (Universidad de Bogotá Jorge Tadeo Lozano), José Morcillo (Universidad de Monterrey), Mónica Castaneda (Tecnológico de Antioquia), Sebastián Zapata (Universidad EIA) and Andres Julián Aristizabal Cardona (Universidad de Bogotá Jorge Tadeo Lozano).

The massification of photovoltaic systems for urban and rural use has allowed the expansion of new renewable technologies that promote the sustainability of the markets. The improvement of the conversion efficiency of the photovoltaic panels, the efficiency of the inverters for connection to the electrical grid, and the dynamism of the distribution systems have had a direct impact on how energy is being generated in the residential, industrial, commercial, and transport sectors. This article presents the energy performance results of a 9.5 kW BIPV system installed in the El Paso residential area, located in Colombia (in the city of Girardot, at 74.7799 longitude and 4.3828 latitude). The main results during the first 3 years of monitoring (March 2019 - March 2022) show that the average energy generation of the system has been 9,910.5 kWh/year; the environmental impact has been 3,645.38 kgCO2-equ. for the first three years of operation and the economic savings by generating clean energy have been 4,776.24 USD.

[2658] *Calculation of the Najaf Watery Depression Radioactive Concentration by Means of the Track Detector CR-39 and Geographic Information System*

Adil Mansoor (College of Education for pure Science-Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq) and Hameed Abduljabbar (University of Baghdad).

In this research, the concentration of radioactivity was calculated for the Najaf watery depression, where samples of water (beach areas) and soil were taken for three weights from locations that were calculated to be able to calculate the values for locations inside the Najaf watery depression using the method of interpolation of Laplace's equation. The two methods of interpolation (IDW) and (TIN) were used to distribute the concentration of radioactivity in the Najaf watery depression area. The results of the distribution of the two layers of water and soil agreed in determining the locations of the areas of high concentration but differed in determining the locations of the low concentration of radioactivity. The radioactivity concentration of soil and water samples was calculated using the CR-39 nuclear trace detector for an exposure period of one month. Satellite images (Landsat 8), which were taken on the same sampling date, were used to determine the places of sampling and to determine the shape of the water depression that was used to distribute the radioactivity concentration of the Najaf watery depression with the assistance of interpolation methods using geographical information systems (GIS).

[2738] *Pyrolysis of Cigarette Waste to Fuel Production*

Nattadon Pannucharoenwong (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Keyoon Duanguppama (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand), Snunkhaem Echaroj (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Chinnapat Turakarn (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand), Kumpanat Chaiphet (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand) and Phadungsak Rattanadecho (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand).

The production of fuel from cigarette waste by pyrolysis in a fixed bed reactor. With the objective of studying the effects of five levels pyrolysis temperature consisting of 400°C, 450°C, 500°C, 550°C and 600°C to fuel content. Then, the pyrolysis temperature that gives the maximum fuel yield is used as a condition for the study of two types was catalysts kaolin, and dolomite. In the case of non-catalyst use the catalysts 200 g and cigarette waste were mixed in the reactor. While the case of using a catalyst must mix the cigarette waste with each catalyst in the ratio 1:1. Which uses about 30 minutes of pyrolysis. The results of the experiment showed that the temperature of the 400°C, the maximum fuel content was 33.3 wt% and fuel have a high heating value (HHV) of 12.8 MJ/kg. When the pyrolysis with the dolomite catalyst, the amount of fuel fell the lowest to 28.6 wt%. This is due to the secondary cracking of the vapor upon contact with the catalyst surface and pores. As a result, the fuel gas content increase of 8 wt%. However, kaolin and dolomite catalysts were improving the fuel properties clearly. The dolomite allows fuel to have a maximum HHV of 18.1 MJ/kg, easy to ignite, low viscosity and high density. If reducing the pyrolysis temperature and improving the production process by using a catalyst to improve the chemical structure in the hot filter, more quality fuel can be obtained. Therefore, should continue to study this research to study the chemical composition to the fuel that used in the future.

[2845] *Optimization of principal dimensions of the ship hull for small-scale LNG carrier*

Muhammad Arif Budiyanto (Universitas Indonesia), Devi Adlyani (Universitas Indonesia), Gerry Liston Putra (Universitas Indonesia), Achmad Riadi (Universitas Indonesia), Gunawan Gunawan (Universitas Indonesia), Kurniawan Teguh Waskito (Universitas Indonesia) and Muhammad Hary Mukti (University College London).

Environmentally friendly fuels are increasingly becoming a binding necessity along with policies to reduce global emissions. Natural gas is a promising fuel for marine transportation. The small-scale LNG carrier is one of the carrier ship designs for distributing natural gas in inland and shallow waters. The purpose of this study is to determine the optimum dimensions SSLNG with three parametric cargo load conditions i.e.: 2500 m3, 5000 m3, and 7500 m3. The determination of design criteria is based on the statistical data from existing small-scale LNG carrier dimensions from all over the world. The result of optimum dimension from the analytical approach obtained the main dimension of small-scale LNG carrier 2500 m3 are length overall 81.5 meters, beam of 14.2 meters, and draught of 4.8 meters. This optimum ship dimension is suitable for serving shallow water conditions.

[2848] *Vertical Tailings Method applying Surface Paste Disposal to Minimize Land Space Waste from Water in Polymetallic Mining in Peru*

Yaneth Vazquez (Universidad Peruana de Ciencias Aplicadas), Vidal Aramburu (Universidad Peruana de Ciencias Aplicadas), Grimaldo Quispe (Universidad Nacional Autónoma Altoandina de Tarma), Javier M. Moguerza (Universidad Rey Juan Carlos), Carlos Raymundo (Universidad Peruana de Ciencias Aplicadas), Renato Guzman (Universidad Peruana de Ciencias Aplicadas) and Karla Borja (Universidad Peruana de Ciencias Aplicadas).

Surface paste disposal (SPD) technology research studies have recently been conducted in-depth seeking to minimize the stability issues faced by mining tailings deposits; however, research is yet to focus on space issues. The objective of this research is to evaluate the disposal of polymetallic tailings by means of the SPD method, leveraging surfaces and recovering water from mines in central Peru. For these purposes, this study will develop a model using SPD to minimize land spaces waste in the deposits. This technique consists of eliminating the water content from tailings with 55% solids and then depositing them on the surface as a paste with a solids' percentage between 70% and 75%, simulating paste layering at the laboratory. The methodological process was conducted in a laboratory where 3 scale models of tailings dams with different dispositions were designed; wherein the arrangement is optimal in terms of space minimization and water use. As a result, approximately 20% of the water used in the conventional method was recovered and approximately 16% of the space was used. This indicates that this method is indeed effective in addressing the main problem and reducing secondary problems that the conventional arrangement causes.

[2870] *A theoretical model for Efficiency N749 Black Dye-Sensitized Solar Cell Based on TiO2 Photoanode*

Naeem Ali (Physics department, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq.) and Hadi Al-Agealy (university of Baghdad).

. In this paper, a theoretical model has been presented for calculating the current density according to the charge transfer theory . The current, current density, I-V characteristics, fill factor and efficiency of Black N749 dye-sensitized contact with TiO2 in solar cell devices are calculated based on solving the electronic current equation using the MATLAB programme. The hetero-junction N749 /TiO2 device solar cell is studied at two various electronic concentration to calculate the I-V characteristic at various hetero-junction properties such as J_Sc (mA/〖cm〗^2), V_oc (Volt) , J_m (mA/〖cm〗^2) and V_m(Volt) which helps to understand the efficiency of device. The I-V characteristics of the device reveal the electric properties and photovoltic behavior. From the photovoltaic I-V characteristic calculated the of the N749 /TiO2 solar cell at different strength coupling ,the both F.F and efficiency are calculated at (1.5 and 2. 5)×〖10〗^18 〖cm〗^(-3), respectively. Furthermore, the increased in both strength coupling and electronic concentration lead to increase the current density and efficiency . It shows that the efficiency large for large concentration and vice versa at limited reorganization energy and the current density increases for increases electron transfer raction process from N749 dye to TiO2 at less reorganization energy. The higher of efficiency 5.175 at 2.5×〖10〗^18 1/〖cm〗^3 evident from the large strength coupling and large electron transfer spectrum comparing to efficiency 3.086at 1.5×〖10〗^18 1/〖cm〗^3with less electron transfer cross interface of heterojunction N749 / TiO2 solar cell devices.

[2872] *Justification for the placement of high-capacity atmospheric water extractors*

Sergey Dorzhiev (Federal Scientific Agroengineering Center VIM (FSAC VIM)) and Elena Bazarova (Federal Scientific Agroengineering Center VIM (FSAC VIM)).

The article considers the possibility of using atmospheric water in arid regions for water supply and fresh water supply. Atmospheric air is a giant reservoir of moisture, up to 20,000 tons of water vapors are contained in 1 km3 of the surface layer of the atmosphere in the hot, arid and desert regions of the Earth. However, water vapor is distributed very heterogeneously over space and time. This is especially true of its vertical distribution. For the study of the transfer of atmospheric water vapor, trajectory models are widely used, the trajectories of which are spatially similar to the atmospheric river, defined by satellite observations. It is well known that the shortage of drinking water is a global problem. However, the reserves of fresh water on Earth are limited (especially in arid zones) and require a stringent course towards rational and integrated use, and new research on the extraction, conservation and distribution of this priceless product. In order to optimally place the equipment for extracting high-capacity atmospheric moisture, it is necessary to identify areas with the maximum water vapor content that can be condensed during the dry period. This uses atmospheric data from the environmental response for many years, as well as the definition of the "channel" of atmospheric rivers" lying on the trajectories of air masses passing through areas with a shortage of fresh water where the integral flow of water vapor is not high, both positive and negative values. A brief analysis of the volume of water in the air was carried out, the classification of fresh water extractors from the atmosphere was presented, their strengths and weaknesses were identified, practicality, as well as the feasibility of different structures.

[2883] *Open Public Spaces as a Tool for activating the Urban Branding of the city of Baghdad*

Sarah Jameel (Al- Nahrain University, College of Engineering, Baghdad- Al Jadiriyah, postcode: 1007) and Shaimaa Hussien (College of Engineering, Al- Nahrain University, Baghdad- Al Jadiriyah, Iraq).

The research demonstrates the role of open public spaces (public squares) in activating the urban branding of the city, especially the Iraqi city (Baghdad), through the selection of Tahrir Square and Al-Umma Park as a case study. The research aims to provide extensive knowledge, especially local knowledge, about the role of open public spaces (public squares) as a tool to activate the urban branding of the city, especially the city of Baghdad. Through the statement of the various dimensions of open public spaces (economic, cultural, social, environmental, and political), and the statement of the components of the image of the city, the identity of the city and the place achieved through open public spaces, and the evaluation of spatial quality criteria for public spaces (urban squares), using the descriptive analytical approach (electronic questionnaire) for the general public in the city. The results show that Tahrir Square and Al- Umma Park effectively achieve the various dimensions of open public spaces, as it is a mixed-use space. in addition to that, the results showed that the square and the park played a crucial role in enhancing the image of the city of Baghdad in particular, and Iraq in general, by considering it as a prominent urban icon.

[2904] *Evaluation of CO2 Emissions from Loading and Unloading Activities in Container Port*

Muhammad Arif Budiyanto (Universitas Indonesia), Faril Ichfari (Universitas Indonesia), Gerry Liston Putra (Universitas Indonesia), Achmad Riadi (Universitas Indonesia), Gunawan Gunawan (Universitas Indonesia) and Takeshi Shinoda (Kyushu University).

Increased CO2 emissions due to port operating activities caused global climate change. Tremendous port development makes it necessary to monitor CO2 emissions at ports to control air quality as an application of the green port concept. This study aims to evaluate CO2 emissions from the loading and unloading of equipment operations in the container port. The estimation of CO2 emission evaluates by the bottom-up model using operational data activities at the container port. A container port with a throughput capacity of up to 9000 TEUs investigate as a case study used several operational input variables. The operational data used includes total throughput, container movement processes, transportation modalities, and terminal layouts. The results of this study show that the total CO2 emission for loading and unloading activities is 1.2 kilotons/year and the CO2 emission per TEU is 13.8 kg/TEU. The contribution of CO2 emissions per loading and unloading equipment at this container terminal is quay crane 54%, rubber-tyred gantry crane 26%, and transfer truck 20%.

[2920] *Is the large wastewater treatment a source of greenhouse gases? Study of the CO2 and N2O production in an Italian plant*

Riccardo Boiocchi (Department of Civil, Environmental and Mechanical Engineering ,University of Trento), Paolo Viotti (Department of Civil, Building and Environmental Engineering, Sapienza University of Rome,), Davide Lancione (SACCIR SpA), Nicoletta Stracqualursi (ACEA Elabori), Vincenzo Torretta (Department of Theoretical and Applied Sciences, Insubria University of Varese), Marco Ragazzi (Department of Civil, Environmental and Mechanical Engineering ,University of Trento,), Gabriela Ionescu (Departement of Energy, Production and Use, Faculty of Energy Engineering, University Politehnica of Bucharest) and Elena Cristina Rada (Insubria University, Department of Theoretical and Applied Sciences).

This paper analyses some aspects of the carbon footprint of a wastewater large plant in central Italy. The plant mainly consists in a traditional activated sludge system with an anaerobic digestion providing a partial contribution of energy for the management of the plant. An integrated approach was considered to evaluate the environmental sustainability of the treatment plant. For the emission assessment different sources were considered: effluent, production and transport of natural gas, energy consumption, boiler, co-generator, digester losses, substrate and endogenous decays. CO2 and N2O emissions were determined. Considerations on the role of CO2 of biogenic origin (specifically the one in the biogas) in terms of sequestration options demonstrate that the analysis in this field should not be limited to the calculation and comment of the non-fossil contribution to the overall balance.

[2934] *Design and development of a Prototype Compact Monitoring System for Lithium-Ion Batteries*

Dimitrios Rimpas (University of West Attica), Stavros Kaminaris (University of West Attica), Dimitrios Piromalis (University of West Attica), Georgios Vokas (University of West Attica) and Vasilios Orfanos (University of West Attica).

Electric vehicles market is evolving rapidly, introducing a plethora of benefits for modern transportation. In addition, the evolution of lithium-ion batteries technology provide high efficiency and performance with sufficient range. To achieve that, advanced battery management systems monitoring parameters, like state of charge and voltage are required. It is essential to keep the battery cells at optimum state, enhancing their safety functioning and useful lifespan. In this paper, a low cost, unified prototype board is developed and tested for monitoring critical battery information, though logged data analysis. A monitoring system has been implemented to optimize system with constant operation diagnosis and data validation. Total efficiency improvement of 5% was established without advanced API interface. The system proved to be reliable with myriad possibilities, limiting battery stress and degradation. Further directions of this work include publishing the data as open-source material, adapting into a wBMS system for real-time adjustment.

[3021] *New Concept of Power Generation from TEGs Using the exhaust gas of boilers and cold oil tank – Thermal Modeling and Parametric Study*

Ali Shaito (Lebanese International University), Hicham El Hage (Lebanese International University), Jalal Faraj (The International University of Beirut), Khaled Chahine (The American University of the Middle East), Mehdi Mortazavi (Worcester Polytechnic Institute), Thierry Lemenand (University of Angers) and Mahmoud Khaled (Lebanese International University).

A new-fangled concept of power generation from thermoelectric generators TEGs using the hot exhaust gas of boilers and a cold oil tank is proposed. The suggested concept consists of a flow of exhaust gas of boilers and cold oil in a tank separated by a plate comprising several TEGs in series. The oil tank at the bottom of the system constitutes the cold convection condition for the TEGs plate and the upper hot exhaust gas flow constitutes the hot convection condition. Accordingly, a temperature gradient is generated across the thickness of the TEGs, which play the role of a separation plate, and converted to an electrical power. To justify the feasibility of this new-fangled concept, a suitable thermal modeling was developed and associated parametric analysis had been carried out. The parametric analysis revealed that powers up to 622 W can be generated with a system having a space heating load of 200 kW, an exhaust gas duct height of 0.05 m and a TEGs plate length of 1 m.

[3087] *Theoretical Investigation of Indium and Temperature Influence on the Intersubband Absorption of InGaN/GaN Quantum Well Structure*

Abdelkader Aissat (University Saad Dahlab Blida1).

We have investigated theoretically the structural and optical properties of Zinc Blende (ZB) InGaN single quantum well grown on GaN substrate with different indium (In) and temperature (T) values. To this aim, we varied the indium composition from 0 to 40%. To determine the eigenvalues and eigenfunctions of this structure we have solved numerically the Schrödinger equation. It is found that both parameters affect considerably the different properties of the InGaN/GaN structure as the strain (ε), band gap energy (Eg), conduction band offset (ΔEc) and the absorption coefficient (α) of the intersubband transition (ISBT). These results make the InxGa1-xN/GaN alloy promising for the design of new devices based only on the intersubband transitions of electrons and pave a way for many mid-infrared applications.

[3114] *Mechanical Properties of Concrete Reinforced with Basalt fibers*

Abdurasul Martazayev (Namangan Engineering Construction Institute).

In the article, the compressive strength, tensile strength, and residual tensile strength of fiber-reinforced concrete reinforced with basalt fibers were studied based on the experiment. Basalt fibers 10 mm and 30 mm in length and 0.017 mm thick were added at 0.0%, 0.1%, 0.2%, and 0.3%. The samples were stored at room temperature and relative humidity above 75%, and the samples were tested on days 7 and 28. The addition of fibers increased the compressive strength, tensile strength, and residual tensile strength of concrete and changed its brittle behavior to a more ductile one. When 10 mm length basalt fibers were added to concrete in amounts of 0.1, 0.2, and 0.3%, the tensile strength was 2.35 MPa, 2.38 MPa, and 2.40 MPa, respectively. When 30 mm length basalt fibers were added to concrete in amounts of 0.1, 0.2, and 0.3%, the tensile strength was 2.22 MPa, 2.32 MPa, and 2.36 MPa, respectively. The compressive strength of prism samples reinforced with basalt fibers increased by 10-20% compared to ordinary concrete.

[3155] *Assessment of flexibility options in electric power systems based on maturity, environmental impact and barriers using Fuzzy Logic method and Analytic Hierarchy Process*

Dimitrios Alexopoulos (University of West Attica), Anestis Anastasiadis (University of West Attica), Georgios Vokas (University of West Attica), Stavros Kaminaris (University of West Attica) and Constantinos Psomopoulos (University of West Attica).

The rapid integration of variable renewable energy sources (vRES) in conjunction with the reduction of coal-fired power plants increase the need for flexibility in electric power systems. In a previous research paper, twenty-three (23) flexibility options were assessed, based on their technical and economic characteristics, using Fuzzy Logic (FL) method and Analytic Hierarchy Process (AHP). Through this research paper the same Flexibility Options (FO) are assessed based on their maturity level, their environmental impact and the technical, economic, social and political/regulatory barriers they encounter in their deployment in Greece, using again FL and AHP methods. Data concerning maturity level and environmental impact are obtained through literature review while data concerning barriers are collected through a survey of energy expert's opinions. In both methods (FL and AHP), Demand Response from Large Industrial Plants (DRLIP) is ranked 1st among the flexibility options having FSI 0.745 and GPV 0.483 while variable Renewable Energy Power Plants (vRE) and Biogas Power Plants (BGPP) are ranked 2nd and 3rd respectively. On the contrary, Power to Gas (PtG) is ranked 23rd (lowest in rank) using FL method and 22nd using AHP method. The results of the research are very important for the

policymakers as they can identify in which sectors (commercial, environmental, technical, economic, social etc.) should take action in order to promote specific flexibility options according to their policy.

[3205] *Structural electronic, elastic and thermic properties of the Silicon Nitride (Si3N4) Ceramic obtained from first-principles calculations*

Latifa Tairi (Research Center in Industrial Technologies CRTI), Sihem Djellab (Laboratoire LPR, Département de Physique, Faculté des Sciences, Université Badji Mokhtar, Annaba, Algeria), Youssra Megdoud (Common Core Science and Technology Department, Institute of Sciences, Centre University Morsli Abdallah Tipaza, Algeria), Karima Amara Korba (Research Center in Industrial Technologies CRTI, P.O. Box 64, Cheraga16014 Algiers Algeria), Sebti Ghemid (Laboratoire LPR, Département de Physique, Faculté des Sciences, Université Badji Mokhtar, Annaba, Algeria.), Houcine Meradji (Laboratoire LPR, Département de Physique, Faculté des Sciences, Université Badji Mokhtar, Annaba, Algeria.) and Samira Tlili (Research Center in Industrial Technologies CRTI, P.O. Box 64, Cheraga16014 Algiers Algeria).

A theoretical study of the structural, elastic, electronic, mechanical, and thermal properties of the polymorph-type ceramic Si3N4 with three phases is presented, however in this work we are focusing on the B phase. The study was carried out using the Wien2k code, which is an implementation of the augmented and linearized plane wave method (FP-LAPW) in the framework of the (DFT) formalism. Pour traiter l'échange-corrélation énergie/potentiel pour le calcul de l'énergie totale, l'approximation généralisée du gradient (GGA) de Perdew-Burke-Ernzerhof (PBE) est utilisée. The six independent elastic constants (C11, C12, C13, C33, C44, C66) are calculated from the direct calculation of the stresses generated by the small deformations. Besides, we report the variation of the elastic constants as a function of pressureas well. From the calculated elastic constant, the mechanical character of Si3N4 is predicted. Pertaining to the thermal properties, the Debye temperature is estimated from the average sound velocity. To further comprehend this compound, the quasi-harmonic Debye model is used to analyze the thermal properties. From the calculations, we find that the obtained results of the lattice constant (a0), bulk modulus (B0), and its pressure derivative (B'0) are in good agreement with the available theoretical as well as experimental results. Similarly, the obtaind electronic band structure demonstrates the semiconductor.

[3280] *Properties Evaluation of Eco-friendly Chitosan Microcapsules Fabricated with Oxalic Acid and Sodium Phosphate Dibasic Mixed Cross-linker*

Lydia Uko (Egypt-Japan University of Science and Technology (E-JUST)), Hussien Noby (Egypt-Japan University of Science and Technology (E-JUST)), Abdelrahman Zkria (Kyushu University, Kasuga, Japan) and Marwa Elkady (Egypt-Japan University of Science and Technology (E-JUST)).

Crosslinking of chitosan microcapsules is important for control purposes according to their applications, and influences their mechanical, thermal and chemical stability, and tripolyphosphate (TPP) has been predominantly utilized in the electrospray technique for their production. The properties of chitosan microcapsules produced by electrospraying technique and cross-linked with a mixed cross-linking solution (OxPh), consisting of oxalic acid and sodium phosphate dibasic were studied. The formed capsules were characterized by SEM, XRD, FTIR, and the stability and mechanical properties of the capsules were studied. The cross-linked microcapsules provided smooth morphology and exhibited mechanical strength of 80% in the undried state, with dried state mechanical strength of 21.2N as against 19.8N of TPP cross-linked chitosan microcapsules. The microcapsules were also stable in pH solution of 3.0-5.0.

[3609] *Low-viscosity Resin and High-Expansion Graphite Synergetic Effects on Electrical Conductivity of Composites for PEFC Bipolar Plates*

Miguel Carrasco-Cordero (Facultad de Ingeniería en Mecánica y Ciencias de la Producción, ESPOL Polythecnic University), Jose Suarez-Loor (Facultad de Ingeniería en Mecánica y Ciencias de la Producción, ESPOL Polythecnic University), Jordy Santana-Villamar (Centro de Energías Renovables y Alternativas, CERA, ESPOL Polythecnic University), Andrés F. Rigail-Cedeño (Laboratorio de Procesamiento de Plásticos, ESPOL Polythecnic University) and Mayken Espinoza-Andaluz (Centro de Energías Renovables y Alternativas, CERA, ESPOL Polythecnic University).

Bipolar plates (BPs) based on a polymer matrix and carbon materials have been lately considered as potential alternatives in polymer electrolyte fuel cells (PEFCs). These materials are affected by multiple factors such as particle size, filler content, the nature of the matrix, and processing parameters. In this sense, the present study focuses on evaluating the effect of low-viscosity epoxy resin and high-expansion ratio graphite on the electrical performance of the composite material. For this, microwave heating and oxygen removal were applied to a graphite intercalated compound with a 230:1 expansion ratio and 180 µm. The resultant sieved expanded graphite (EG) was mixed with a DGEBA-based resin in

proportions of 40, 50, and 60 wt.% of EG. To assess the curing procedure of the composite, gelation time and thermogravimetric analysis were performed. X-ray diffraction and scanning electron microscopy (SEM) were applied to fillers and composites. Results show that the maximum in-plane electrical conductivity was 161.25 S/cm and occurred at 60 wt.% EG. Also, a fully cured matrix and, highly amorphous and porous EG were obtained according to the analysis performed. Therefore, this methodology provides an optimal composite material able to overpass the standards for BPs set by the Department of Energy (DOE).

[3651] *Prediction of the surface tensions of a set of propane derivatives using a mixed approach in silico.*

Khadidja Amirat (Department of Chemistry, University of Sétif 1 , Ferhat Abbas,El Bez, Setif, 19000, Algeria), Nadia Ziani (Department of Chemistry, Faculty of Science, Badji Mokhtar University Annaba, BP 12, Annaba, 23000, Algeria.), Souhaila Menaceur (Process Engineering Department, Hamma Lakhdar University of El-Oued, Algeria.) and Fatiha Mebarki (Material Sciences Department, University of Tamanrasset, Algeria.).

The surface tensions of a set of propane derivatives including between 8.23 and 34.09 were linearly correlated with one selected molecular descriptor, this descriptor was chosen among more than 1600 calculated using the molecular modeling software DRAGON. The various statistics for this set of propane derivatives (multiple coefficients of determination and prediction, root mean square error) show the quality, robustness and good predictive capabilities of the built model.

[3862] *Energy and environmental impact of the way of life in Côte d'Ivoire: case of direct CO2 emissions in Abidjan modes of transport*

Kouamé Norbert N'Guessan (Institut National Polytechnique Félix Houphouet-Boigny de Yamoussoukro (INP-HB)), Christelle Périlhon (Conservatoire national des arts et métiers (Cnam)), Kouadio Alphonse Diango (Institut National Polytechnique Félix Houphouet-Boigny de Yamoussoukro (INP-HB)), Yao N'Guessan (Institut National Polytechnique Félix Houphouet-Boigny de Yamoussoukro (INP-HB)), Hie Koumayo (Institut National Polytechnique Félix Houphouet-Boigny de Yamoussoukro (INP-HB)) and Mohamed Koïta Sako (Institut National Polytechnique Félix Houphouët-Boigny de Yamoussoukro (INP-HB)).

Human activities have warmed the earth (IPCC, 2021) and therefore, the way of life which is defined as the set of usual practical choices in an organizational and technical community system (Rauschmayer, 2016). The way of life is defined in terms of consumption types or activity types. In Côte d'Ivoire, transport activity represents 18.22% of all activities in the country by 2030 GHG's emissions (INDC, 2015) and fuel consumption (Gasoline, lamp oil, diesel fuel) in 2019 in the district of Abidjan represents 54.01% of national consumption (DGH, 2021). This study on direct CO2 emissions for passenger transport over one kilometer for each 10 transport modes in the city of Abidjan, follows a survey carried out in 2019 (N'guessan et al., 2020). The results in ascending order are 14.88 CO2/p.km for Monbus, 25.35 CO2/p.km for Confort+, 31.83 CO2/p.km for Gbaka, 36.65 CO2/p.km for Express, 53.22 CO2/p.km for Wibus, 62.56 CO2/p.km for Intercommunal taxi, 81.47 CO2/p.km for Monbato, 107.55 CO2/p.km for Communal taxi, 159.16 CO2/p.km for Personal car and 253.93 CO2/p.km for Taxi. The specific emissions of all Sotra buses is 20.88 CO2/p.km and 26.95 CO2/p.km for all Sotra buses and Gbaka. The CO2 emission factor for all terrestrial passenger transport modes in the city of Abidjan is 71.07g CO2/MJ. The more the occupancy rate of a transport mode increases, the more its specific CO2 emissions decrease. The Abidjan person who wants to reduce his environmental impact must avoid using the Personal car and Taxi transport modes and use only the Gbaka and Sotra service buses for their road transportation vehicle.

[3951] *Rock Mass Classification Method Applying Neural Networks to Minimize Geomechanical Characterization in Underground Peruvian Mines*

Julyans Brousset (Universidad Peruana de Ciencias Aplicadas), Humberto Pehovaz (Universidad Peruana de Ciencias Aplicadas), Grimaldo Quispe (Universidad Nacional Autónoma Altoandina de Tarma), Carlos Raymundo (Universidad Peruana de Ciencias Aplicadas) and Javier M. Moguerza (Universidad Rey Juan Carlos).

Underground mining is currently facing rock mass classification problems owing to alterations to the geology of mines, which results in classification methods not fitting to certain characteristics of the rock mass. As current classification methods are based on specific geologies, the rock mass classification presents uncertainties, when such methods are applied in places for which they are not developed. Hence, the rocks found in underground mines cannot be easily identified. Therefore, rock mass classification estimates must always be verified against the actual rock mass as work progresses. At present, different methods are used for rock mass classification, which mostly use statistical tools and tables to support geomechanical predictions. However, as reported by technical teams, these tools sometimes generate

uncertainty regarding the actual rock classification. To prevent this, artificial neural networks use input and output data to spot or solve the problems those may arise. In fact, neural networks (NNs) can determine the Rock Mass Rating (RMR) of a rock with a 0.279% error, based on the rock mass properties. Additionally, several NNs can be adapted to different rock types to better determine the RMR of the rock mass.

[4085] *Studying the effect of partial replacement of the Sb nanocomposite on the structural properties of the superconducting Bi2-xSbxBa2Ca2Cu3O10+ □ compound*

Omar Gitan (University of Tikrit College of Education Department of Physics), Abdul Kareem Ali (University of Tikrit College of Education Department of Physics) and Kareem Jasim (university of Baghdad/ college of pure science Ibn Alhaitham/ Country. Iraq).

The current work includes studying the effect of partial substitution of antimony nanoparticles instead of bismuth on the electrical and structural properties of the superconducting compound Bi2-xSbxBa2Ca2Cu3O10+δ, where x = 0, 0.1, 0.2, 0.3, and the samples were prepared by the solid state reaction (SSR) method. The samples were sintered in normal air and at a temperature of 800°C for 48 hours at a heating rate of 10°C/min. X-ray diffraction tests were carried out on the four samples of different antimony concentrations. The results showed that all samples had a orthotropic structure, with differences in the lattice constants (a, b andc,)with a clear increase in the dimension c = 36.6899 Ao for the second sample when x = 0.1, as well as an increase in the percentage of the high phase HTP%, which equals 68.16%, and the formation of And the structure (morphology) by the SEM device for the samples, the formation of a granular size with Nano-dimensions was observed, and the element analysis for each sample was examined through EDS examination, as the results showed the presence of the elements and their different proportions in each sample.

[4153] *Study of Cross – Section for Reaction (n,γ) for (12C, 35Cl, 37Cl, 22Na,127I) Isotopes*

Duaa Salim (Medical physics Department, Madenat Alelem University College, Baghdad, Iraq).

. In this paper, the interaction cross-sections (n,γ) of certain elements of the isotope nuclei (12C, 35Cl, 37Cl, 22Na,127I) were studied. As the study of any interaction, it is necessary to know and measure the probability of this interaction, and this possibility can be measured experimentally or mathematically. These cross-sections were calculated by using matlab (2017) program for the range of energies (10-20) MeV and with a specific energy step (0.5) MeV based on the values measured experimentally by fitting and interpolation of the values of missing energies in the international codified laboratories. The cross-sections are considered important quantities in the analytical issues for the manufacture of shields and safety from radiation hazards and safety

---

[4183] *Partial Substitution of Lead with Nickel on the Structural and Electrical Properties of pb1-xNix Ba2Ca2Cu3O8+δ Superconducting Compound*

Ch. Saleh (Directorate of Education Kirkuk, Education Department of Kirkuk, Iraq.), Alyaa Jassim (Directorate of Education Salah Uddin, Education Department of Tuz, Iraq.) and Kareem Jasim (university of Baghdad/ college of pure science Ibn Alhaitham/ Country. Iraq).

In this study, we report the investigation of the simultaneous effect substitution of nickel in a layer for a lead in a pb1-xNix Ba2Ca2Cu3O8+δ superconductor. bulk polycrystalline Samples were prepared by solid-state process reaction. The electrical properties represented by the electrical resistivity as a function of temperature were studied using four probe techniques to determine transition temperature Tc. It was found that Tc critical temperatures for pb1-xNix Ba2Ca2Cu3O8+δ with x = 0, 05, 0.1 and 0.15 at zero resistivity Tc(Offset) were 98, 101, 106 and 118 K and at onset resistivity Tc(Offset) were 116, 120, 124 and 131 K, Respectively. The structural properties of the samples were studied using X-ray diffraction. The XRD charts showed all the samples have a quadrangular structure, with a clear change in the lattice constants. The results also showed that the samples were clearly affected by the replacement of lead with nickel.

[4230] *Geopolymer Bricks from Iraqi Local Ores*

Rawnaq Mahdi (University of Technology), Hawraa Dheaaldin (University of Technology), Mayyadah Abed (University of Technology) and Aseel Al-Zubaidi (University of Technology).

Geopolymer bricks are synthesized from Iraqi ores. Their mechanical properties are investigated and compared with commercial bricks. Comparison between two different compound groups (i.e. kaolin based compounds (KBB) and unfired brick waste-based brick (UFWBB) as group B) was attempted. The effect of flint on the mechanical properties of the bricks specimen is also investigated. Results show that the compression strength and hardness may be enhanced with the

addition of flint content. The group compounds investigated show distinct behavior for each group of the materials. The majority of manufactured bricks improved Iraqi ores-based geopolymer bricks' thermal conductivities, increased porosity, and produced lighter bricks.Key words: Geopolymer bricks, flints rocks, kaolin rocks

---

[4358] *Bioelectricity generation through Microbial Fuel Cells using Serratia fonticola bacteria and Rhodotorula glutinis yeast*

Fernanda Silva Palacios (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Angie Salvador-Salinas (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Merardo Quezada-Alvarez (Departamento de Ingeniería Ambiental. Universidad Nacional de Trujillo, Trujillo, 13011, Perú), Magda Rodriguez-Yupanqui (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Segundo Rojas Flores (Vicerrectorado de Investigación, Universidad Autónoma del Perú, Lima 15842, Perú), Renny Nazario-Naveda (Vicerrectorado de Investigación, Universidad Autónoma del Perú, Lima 15842, Perú) and Luis Cabanillas-Chirinos (Institute for Research in Science and Technology, Universidad Cesar Vallejo, Trujillo 13001, Peru).

Nowadays, there is great interest in microbial fuel cells because of the different substrates that can be used in them for electric energy generation. In order to find an alternative and contribute with eco-friendly technologies, this research used the Serratia fonticola bacteria and Rhotula glutinis yeast as a fuel source through laboratory scale microbial fuel cells. A single chamber microbial fuel cell with air cathode was fabricated with a copper foil and a graphite plate as anode and cathode electrode respectively. For the characterization of the cells, physicochemical parameters such as voltage, electric current, pH and electrical conductivity were measured for 30 days and at room temperature (18 ± 2.2 ºC). It was possible to generate peak voltage and current values of 0.53 ± 0.01 V and 0.55 ± 0.02 V and current values of 1.76 ± 0.16 mA and 1.52 ± 0.02 mA, for MFCs with bacteria and yeast respectively. In addition, acidic operating pH was observed, and its conductivity peak values around 242 mS/cm. Finally, this work demonstrates the great potential that microorganisms have for the generation of electric current, giving a new and promising way to generate electricity.

[4470] *The 12 November 2018 Mw 6.3 Iraq-Iran Border Earthquake by Using InSAR Technique*

Baqer Hussein Sayyid (University of Baghdad), Auday Shaban (Department of Remote Sensing and GIS, College of Science, University of Baghdad, Baghdad, Iraq) and Najah Abd (Department of Geology, College of Science, University of Baghdad, Baghdad, Iraq).

Interferometric Synthetic Aperture Radar (InSAR) is a powerful technique used for measuring and monitoring surface deformation due to natural hazards. It combines Synthetic Aperture Radar (SAR) with interferometry and is used to detect small changes in surface deformation over time, regardless of weather or time of day. InSAR is extensively used to monitor and measure earthquakes, volcanoes, and land subsidence. This paper reviews the application of InSAR in earthquake monitoring and deformation analysis. The reviewed studies demonstrate the effectiveness of InSAR in detecting and monitoring ground deformation caused by earthquakes. The use of advanced remote sensing technology and data processing techniques have enabled the detection of deformation at increasingly high spatial and temporal resolutions. Additionally, the paper provides a case study of a 6.3 Mw earthquake event in 2018, discussing the fault type and displacement map generated through InSAR technology. In conclusion, InSAR is a valuable tool in natural hazard monitoring and has wide-ranging applications from structural engineering.

[4513] *Influence of Air Ceiling Diffusers in Enclosed Spaces: An Experimental and Numerical Investigation*

Mina Saad (Arab Academy for Science, Technology & Maritime Transport), Micheal William (Arab Academy for Science, Technology & Maritime Transport), Amr Ali Hassan (Arab Academy for Science, Technology & Maritime Transport) and Ahmed Hanafy (Arab Academy for Science, Technology & Maritime Transport).

Within the past few years, IEQ has been a hot topic among building occupants, government officials, and academics all around the globe. Most modern life is spent indoors, in homes, workplaces, and shopping centres. People's awareness of the need for healthy indoor air quality (IAQ) rises in tandem with their rising standard of living. Along with air temperature, humidity, and cleanliness, air velocity in a climate-controlled room affects the space's microclimate. In particular, reducing discomfort in enclosed areas is a function of having an adequate distribution of air velocities. This study employs computational fluid dynamics (CFD) models to examine the effects of types of air diffusers in an enclosed office space in Alexandria, Egypt, on the ensuing air velocities and temperature gradients. Model accuracy has been confirmed by comparing numerical simulations to physical measurements. The simulations demonstrated that the square diffuser was superior in temperature distribution uniformity within the office volume but that there was a significant

interaction between supply diffusers. The round diffuser had faster velocities in the standing and sitting planes (1.2 and 1.8 m) and a lower average temperature, implying that it can be employed with a reduced fan speed than the square diffuser, reducing overall power use.

[4522] *Calculation of total stopping power of the radioactive isotopes of Carbon-14 and Florine-18 used to treat cancer patients*

Saad Mohammed (Basic Education College, Al-Anbar University, Iraq), Ali Aobaid (College of Education for Pure Science- University of Anbar, Iraq) and Sameera Ebrahiem (University of baghdad).

Radioactive Carbon-14 and Fluorine-18 isotopes were bombarded with alpha particles within an energy range of (10–100MeV) the electronic and nuclear stopping power was calculated using SRIM2013 program. After that, we used the Matlab program and the Igor program to compute the total stopping force in non-calculated energy values in the SRIM program, and the work of interpolated to calculate the total stopping power of the radioactive Carbon-14 and Fluorine-18 isotope used in the treatment of cancer.

[4596] *The Effect of Phonons-Surface and Grain-Boundary Scattering On Electrical Properties of Metallic AL, Cu*

Fairooz Alderbas (Department of physics, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Iraq) and May Najeeb (Department of physics, College of Education For Pure Science (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq).

. Using a Fuchs-Sondheier model, which represents the surface scattering of electrons and known as the surface scattering coefficientp, we demonstrate the influence of thickness on electrical resistivity for metals in this study of the electrical characteristics of (aluminum, copper) metals. Talk about how the Mayadas-Shatzkces model, which represents the grain boundaries' effect on electron scattering and known as grain boundary reflection coefficient R, affects electrical resistivity for Cu. where the electrical characteristics of metal vary depending on the substance's concentration, The results then demonstrated that the electrical resistivity at all temperatures increases with decreasing thickness, which indicates that copper has 0.0017 as the grain boundary reflection coefficient and aluminum has surface Scatering Coefficient 0.45 and zero for copper.

[4616] *Modeling of modes of traction power supply systems equipped with renewable energy sources*

Konstantin Suslov (Irkutsk National Research Technical University), Andrey Kryukov (Irkutsk National Research Technical University (INRTU)), Pavel Ilyushin (Energy Research Institute of the Russian Academy of Sciences (ERI RAS)) and Olga Shepovalova (Federal Scientific Agroengineering Center VIM (FSAC VIM)).

Computer models of traction power supply systems equipped with wind power plants have been developed. The models are implemented on the basis of phase coordinates and lattice equivalent circuits with a full graph topology. It is shown that the inclusion of wind power plants allows to reduce the flows of active and reactive power in the supply network, significantly reduce losses and improve the power quality.

[4855] *Performance Enhancement of the Roll Stabilization Systems used for Ships*

Hesham Aboemiera (Arab Academy for Science Technology &Maritime Transport), Ahmed S. Shehata (Arab Academy for Science Technology &Maritime Transport), Khaled Elsherbiny (Arab Academy for Science Technology &Maritime Transport) and Ahmed Khalifa (Arab Academy for Science Technology &Maritime Transport).

Reducing the ship rolling motion is an important subject of the ship motion control. In addition, the fin stabilizer is one of the most effective ship stabilizers, which plays an important role in decreasing fuel consumption, improving the ship seaworthiness, giving a longer life for the ship, ensuring the equipment on the ship-working better and making the ship members feel comfortable, advance battle effectiveness of the naval ships. In our research, we concentrate on a hydrofoil fin stabilizers, which are used in both sides of ships. Our aim is to profile the optimum design of foils to enhance the effectiveness of ship stabilizers by more investigation in different experimental models& comparing them. Finally, we have reached the best form and the best dimensions of hydrofoil fin stabilizers used in the experiment, which is NACA-04, which is better than the other foils.

[5036] *HESS Based Hybrid Microgrid for Islanded and Grid Connected Operation*

Erdal Sehirli (Kastamonu University), Yücel Çetinceviz (Kastamonu University) and Ömer Usta (Istanbul Technical University).

Hybrid micro grid system consisting of diesel generator, PV array, wind energy units using HESS including SMES, Li/Ion battery, SC is presented in this paper. Also, grid connection of DC bus is achieved by using NPC. Grid connected, islanded, mode operation is investigated for microgrid system. Although such operation is not presented in literature for SMES, this paper examines not only SMES but also Li/Ion, SC. Furthermore, MPPT including P&O algorithm through Cuk converter is used for transmission of PV power to dc bus. Moreover, Li/Ion battery, SC and SMES have bidirectional converters separately providing bidirectional power flow. In addition, produced energy by wind, diesel generator units using synchronous generator is transferred to DC bus via buck converter connected to output of the rectifier. Besides, supervisory controller carries out the charge/discharge of battery, SC, power transmission of SMES and enables diesel generator, according to SOC of Li/Ion and SC, PV energy existence, wind speed, grid power. Supervisory controller also realizes load shedding of non-critical loads on the condition of non-existing enough power. Presented system is analyzed for islanded mode and grid connected operation through Matlab/Simulink. Owing to the simulation, SMES, SC, Li/Ion battery, wind, PV, diesel generator and grid power transmissions are presented. Seamless operation of proposed system is achieved, fast transients under few cycles are acquired regarding to operation mode. THD of phase voltages, currents provide the limit in standards which is not given in other papers in the literature in detail.

[5054] *Calculation of protons stopping power in Yttrium-90 and Iodine -131 radioactive isotopes*

Saad Mohammed (Basic Education College, Al-Anbar University, Iraq), Ali Aobaid (College of Education for Pure Science- University of Anbar, Iraq) and Sameera Ebrahiem (University of baghdad).

This research demonstrates the radioactive Yttrium-90 and Iodine -131 isotopes were bombarded with protons within an energy range of (10–100MeV) the electronic and nuclear stopping power was calculated using SRIM2013 program. After that, we used the Matlab program and the Igor program for counting the total preventing power in non-calculated energy values in the SRIM program, and the work of interpolated to calculate the total stopping power of the radioactive Yttrium-90 and Iodine -131 isotope used in the treatment of cancer

---

[5107] *Preliminary Study on End-of-Life Vehicles Recycling Rate for Malaysia*

Mohd Syafiq Sulaiman (Universiti Kebangsaan Malaysia), Dzuraidah Abd Wahab (Universiti Kebangsaan Malaysia), Zambri Harun (Universiti Kebangsaan Malaysia), Hawa Hishamuddin (Universiti Kebangsaan Malaysia), Nor Kamaliana Khamis (Universiti Kebangsaan Malaysia) and Mohd Radzi Abu Mansor (Universiti Kebangsaan Malaysia).

Malaysia has yet to introduce a proper laws and regulations that allow appropriate disposal of End-of-Life Vehicles (ELV). Moreover, there are lacks data captured regarding the management of ELV across different management due to unknown practices and systems. The implementation of non-environmentally ELV processed which include river dumping has raised varied issues. Recently, Ministry of International Trade and Industry (MITI) and Malaysia Automotive, Robotics and Iot Institute (MARii) has introduced several measures starting with the introduction of automotive national policy towards the importance of 4R concept on ELV management which stands for reuse, repair, remanufacturing and recycle. These measures have highlights most of the important aspects for one of the ELV stakeholders targeting Authorised Automotive Treatment Facility (AATF) which shows its important as the bridging facility connecting other relevant stakeholders. To evaluate the importance and AATF functions, a study was conducted to examine and characterise AATF process in Malaysia while evaluating the wastes generated from the practices. From the initial results, the recycling rate of ELV done in AATF has managed to achieve around 90% while more than 93% if some of the process include other stakeholders. Moreover, it is expected that more materials and components can be recycled and recovered given the other ELV treatment stakeholders being taken into.

[5111] *Relative Humidity Impact on the Performance and Internal Resistances of a PEFC Working at Maximum Output Power*

Jordy Santana Villamar (Escuela Superior Politécnica del Litoral (ESPOL)), Mayken Espinoza Andaluz (Escuela Superior Politécnica del Litoral (ESPOL)), Samir Echeverría (Escuela Superior Politécnica del Litoral (ESPOL)), Gabriel Cedeño (Escuela Superior Politécnica del Litoral (ESPOL)) and Martin Andersson (Lund University).

Polymer electrolyte fuel cell (PEFC) development goes hand in hand with a complete understanding of its behavior in realistic operating conditions. Hence, analysis based on characterizations is essential to determine the predominant effects that strongly affect the PEFC performance. Experimental research is carried out using a single PEFC under

controlled conditions. The primary objective is to examine the cell's maximum power output through polarization curves, Nyquist diagrams, and internal resistant graphs. The analysis is performed varying the relative humidity (RH) of the cell from 16% to 100%. The results are accomplished by employing current sweep load and electrochemical impedance spectroscopy. Results show a strong correlation between the RH and the PEFC performance, as the total resistance of the membrane increase at a lower relative humidity of the inlet gases. The internal resistances are evaluated individually and presented in graphs. All show a decrease when the RH increases, where ohmic and mass transport resistances are the most affected by the RH. Furthermore, the mass transport and ohmic resistances were dominant at low RH. In contrast, ohmic and charge transfer resistance were prevalent at high RH, indicating the required improvements at these points. Finally, several correlations are proposed to obtain internal resistance values as a function of the RH.

[5118] *Global trends in building energy management systems (BEMS): A science mapping approach*

Eliseo Zarate-Perez (Universidad Privada del Norte (UPN); Universidad Nacional de Educación a Distancia (UNED)), Cesar Santos-Mejía (UNED) and Rafael Sebastian (UNED).

The building systems are being projected in the improvement of the efficiency of the total energy consumption and the integration of renewable energies. However, buildings have become increasingly complex because they integrate different types of local energy generation, distribution, consumption, and storage elements. That is why energy management is considered an optimization problem. Therefore, the objective of this review work was to establish a scientific map of building energy management systems (BEMS) and to identify the scientific production that identifies future research projections. In this sense, the bibliometric review methodology was used to quantify the performance, quality, and impact of the research field. The scientific mapping approach analyzes the co-occurrence of terms through clustering techniques and performance analysis to detect and visualize conceptual subdomains of BEMS. The results show five thematic areas in two evaluated periods: Wireless sensor networks (WSN) and office buildings as leading themes in the period 2000 – 2015. While photovoltaic systems (PVS) and internet of things (IoT) are identified as the important issues for the period 2016 – 2022. The most challenging issues of the BEMS is to maximize energy efficiency by minimizing energy losses and consumption. These concepts have given rise to the IoT, which is shown as a motor theme in the strategic map of bibliometric analysis. However, the thematic concept of the Internet of Energy (IoE) in energy monitoring and control in buildings through bidirectional communication between the smart grid and BEMS is appreciated. Therefore, this review highlights IoT and IoE-based BEMS power management as key technologies to support future advanced BEMS implementation.

[5272] *Numerical Investigation of Hybrid Nanofluid Heat Transfer Performance in Jet Impingement Cooling*

Nur Syahirah Mohamad Hanafi (Universiti Kebangsaan Malaysia), Wan Aizon W Ghopa (Universiti Kebangsaan Malaysia), Rozli Zulkifli (Universiti Kebangsaan Malaysia), Mohd Anas Mohd Sabri (Universiti Kebangsaan Malaysia), Wan Fathul Hakim W Zamri (Universiti Kebangsaan Malaysia) and Meor Iqram Meor Ahmad (Universiti Kebangsaan Malaysia).

Liquid coolant is an important substance often used to lower the temperature of an object. To increase the heat transfer performance of a coolant, metal nanoparticles are introduced into a base fluid such as water, which is then called a nanofluid. A further development is the hybrid nanofluid, in which researchers try to mix two types of metal nanoparticles with high thermal conductivity to further increase the heat transfer performance. In this work, the heat transfer performance of a hybrid nanofluid in delivering heat from a target surface is investigated using a cylindrical single-jet impingement method. A three-dimensional numerical analysis is performed using Ansys FLUENT to investigate the effects of different types of coolants on the heat transfer performance. The coolants used in the simulation were pure water, Al2O3-Cu/water hybrid nanofluid, Al2O3/water nanofluid, and Cu/water nanofluid with 0.5% volume concentration. The effects of Reynolds number on the heat transfer performance of hybrid nanofluid were presented and discussed in detail. The results showed that hybrid nanofluid has the highest heat transfer performance compared to pure water and single particle nanofluids.

[5355] *Distribution of fugitive emissions in the energy complex of Russia during the supply of oil to refineries*

Vladimir Pavlovich Klepikov (National Research University Higher School of Economics) and Liubov Vladimirovna Klepikova (University of Transport (MIIT)).

Large volumes of oil in the energy complex of Russia are annually delivered by pipeline and rail transport to refinery warehouses and stored there until it is processed. Each element of the oil supply chain generates significant amounts of fugitive emissions. The quantitative determination of these emissions is a gap in the research of the energy complex. The paper developed a method for estimating the volume of fugitive emissions in oil supply chains at refineries in the energy complex. The study period under consideration is 2009-2021. The study showed that in the oil supply chain, the largest emissions are produced when oil is stored in refinery tank farms. The amount of these emissions is an order of magnitude greater than the amount of emissions from oil transportation. When transporting oil to refineries of the energy complex, pipeline transport has the greatest environmental advantage. It is several times inferior to railway transport in terms of the fugitive emission produced.

[5511] *Thermographic Image Processing Analysis in a Solar Concentrator with Hard C-Means Clustering*

Marco Flores (Universidad Nacional Autónoma de Honduras), Fernando E. Serrano (Universidad Nacional Autónoma de Honduras), Carlos Cadena (Universidad Nacional de Salta) and José C. Alvarez (Universidad Peruana de Ciencias Aplicadas).

This research study consists into three steps: First the edges of the thermographic images are obtained by a low pass butterworth filter and then by a feature extraction algorithm the temperature grid is obtained, to be classified later by a hard C-means clustering algorithm. With the hard C-means algorithm the isotherms level curves and temperature plots are obtained. After the low pass filtering of each thermographic image by the butterworth filter, the temperature grid in the solar concentrator is obtained by implementing a feature extraction algorithm in order to separate the temperature grid in the image in order to classify the temperatures by a hard C-means algorithm selecting the center of each cluster in order to find precisely the temperature region in order to generate the isotherms and extract the temperatures with this efficient algorithm. Then, two analysis are performed to validate that the original unprocessed thermographic images coincide with the processed images, not only spatially and even in their spectrum to corroborate the fidelity of the digital image processing methodology implemented in this research study. For these purposes, a frequency domain convolution between the processed and original images are performed to validate that the image has coincidences in spatial and frequency domain. Finally, a correlation analysis is performed to validate how the original thermographic images coincides in temperatures.

[5658] *Study of the cross-sections of neutron interaction with lithium isotopes according to the reaction of the revers reaction*

Thurya Ali (Physics department, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq.) and Sameera Ebrahiem (University of baghdad).

In this study, and the importance of lithium the light elements for 6Li, 7Li, 6He and 7He that enter into the reactions (n,p) and (p,n) were studied in addition to calculating the cross section as a proton occupation energy (12.49 MeV to 16.995 MeV) for 7He(p,n)7Li reaction Calculated by the reverse reaction method from 7Li(n,p)7He and the cross section as an energy function of for the 6He (p,n) 6Li reaction calculated by the reverse reaction method from 6Li(n,p)6He by the range (0.2499 MeV) to (1.9996 MeV) are used as far as the data of reaction cross sections are available. These calculated on the ground state with parity of 6Li , 6He , 1+ , 0 + respectively and with threshold energy 17.776 MeV. The current cross sections data of (p,n) and (n,p) reactions are reproduced in fine steps 0.1 MeV and 5.0 MeV for 7Li(n,p)7He and 6Li(n,p)6He Respectively, as well the reaction cross sections was calculated 6He (p,n) 6Li a proton energy function, this is in order to produce the isotope lithium-6 and because this isotope is of great importance in modern technologies .

[5819] *Neural Network Predictive Control for Detection and Mitigation of LVRT In Doubly Fed Induction Generators with Superconducting Magnetic Energy Storage*

Mohamed Saeed (Mansoura University), Ernest Morgan (Egypt-Japan University of Science and Technology (E-JUST)), Paul Timo (Egypt-Japan University of Science and Technology (E-JUST)) and Tamer Megahed (Egypt-Japan University of Science and Technology (E-JUST)).

Doubly fed induction generators (DFIGs) have attracted a lot of attention although they are vulnerable to grid failures due to their intermitted behavior. Currently, wind turbines (WT) must function continuously even in the face of severe failures since low voltage ride-through (LVRT) is required by modern electrical grid standards. Hence, to maximize active and reactive power efficiency, a novel fault detection and identification (FDI) approach based on dynamic wind speed prediction, utilizing artificial neural networks (ANN) is suggested. Also, ANN analyses the DFIG output voltage to distinguish between healthy and unhealthy circumstances produced by either wind speed variation or grid failures. The

rotor side converter (RSC) and grid side converter (GSC) are controlled by neural network predictive control (NNPC). NNPC is a model predictive control (MPC) that takes its control decision based on ANN tracking signal. In addition, superconducting magnetic energy storage (SMES) is utilized in parallel with DC-link circuits to increase system performance, decrease voltage drops (VD) at the point of common coupling (PCC), improve power-sharing, and reduce the transient duration. The suggested FDI and control methods are validated using MATLAB simulations. The findings confirm the system's efficiency, speed, robustness, and resistance to noise and unknown inputs.

[5952] *Test methods and standardization of photoelectric equipment*

Olga Shepovalova (Federal Scientific Agroengineering Center VIM (FSAC VIM)).

This article deals with the analysis of tests that have to be performed, on different stages of various photoelectric equipment lifecycles, with respect to various possible operation conditions. Besides, the availability of relevant standards and their compliance with the corresponding requirements has been studied. The analysis was made on the basis of IEC and ISO standards and on that of the national RF standards. Particularly, fundamental series of standards IEC 61215, IEC 61730, IEC 62108 и IEC TS 63163:2021 have been analyzed in terms of PV modules compliance with the technical specifications and safety requirements. The issues of the necessary tests for PV modules that have to be performed, for certain specific applications that are not normally carried out or/and have not been considered in standards, have also been studied, in this article, and the methods of such tests have been described.

[6060] *Combined Solar Chimney and Geothermal System Using Abandoned Oil Wells in Egypt*

Lamis Morsy (Marine and Offshore Engineering Department, College of Engineering and Technology, AASTMT), Ahmed Shehata (Marine and Offshore Engineering Department, College of Engineering and Technology, AASTMT), Ashraf Sharara (Oil and Gas Engineering Department, College of Engineering and Technology, AASTMT) and Yehia Eldrainy (Mechanical Engineering Department, College of Engineering and Technology, AASTMT).

Due to the overpopulation in Egypt, two significant concerns should be considered such as ensuring a future supply of energy and freshwater to fulfil the demands of its expanding population and its agricultural sector and the Nile River may not be able to keep up with the demand at this time due to changes in the monsoon pattern and a loss in storage capacity. So Egypt needs to increase its energy using clean, sustainable and renewable resources of such as solar, wind, geothermal resources side by side with the usage of the oil and natural gas resources on which it mainly depends and also develop low-carbon society. The objective of this study is to solve the problem of the inconsistent power generation using renewable energy through introducing hybrid system between solar chimney and geothermal, this system will overcome the drawback of solo solar chimney system of being unproductive at night as well as the low potential energy extracted from geothermal and will give us energy all day and night. And in addition to this we are going to use abandoned oil and gas wells to reduce the initial cost for drilling new one. From this hybrid system we can get energy to generate electricity and we can also use it to get fresh water from operating a desalination unit. A numerical simulation for a 2D axisymmetric model of solar chimney and the associated heat exchange with the ground took place. The work presented in this paper simulates the velocity and temperature inside the solar chimney as the ambient temperature of air outside is 293.15 K and the power output of the proposed system will be about 106.38 KW. The turbulence model used is standard k-ε model and boussinesq model is adopted.

[6064] *Heating requirements calculation from an adaptative perspective. The case study of a historical building: the Busquets House*

Susana Lage-Cal (University of Oviedo).

Nowadays, thermal inner comfort has become a prerogative either for inhabitants, workers, or even casual users of any type of buildings. Simultaneously, current historic juncture has converted energy saving and CO2 emissions reduction into a must. Particularly, when it comes to patrimonial constructions in use, both objectives are to be achieved complying with the legal framework that ensures future preservation. The aim of this work is to quantify eventual energy savings in an Asturian historical residence (the Busquets House), when comfort heating requirements are cut down. To do so, comfort condition has been established according to Dear and Brager (2001) adaptative model and reductions have been set according to lower 80% and 90% acceptable limits. A transient regime simulation of the house thermal behavior was also developed. Therein, former conditions were integrated as inputs and final heating energy demand was obtained as an output. Simulation results revealed that, in a regular use scenario, 100% acceptability requires 12.317 MWh/year, 90% acceptability needs 8.183 MWh/year, and 80% acceptability demands 6.830 MWh/year. In other words, if criteria of 20% most cold-sensitive people were not to be considered, heating expenditure at the Busquets House could be reduced by 46.29%.

[6164] *Simulation and Comparison of Gas Turbines in UAE Using Heavy Duty Gas Turbine Modelling with LCOE*

Ali S. Alhammadi (Green House Gas), Mas Fawzi (Green House Gas) and Ali S. Alhammadi (Green House Gas).

This paper presents the comparison between old and new gas turbine technologies for identification of the better performing machine. The aim of this paper is to test and simulate the turbines for comparison to show by how much an improvement the new gas turbine technology can be. This is done to offer substantial reasoning for upgrading present day conventional combined cycle power plants in the UAE. The turbines will be modeled and simulated using a simplified heavy duty gas turbine modelling. Both turbines, old and new, to be modelled are rated to be 185 and 220 MW at 50 Hz nominal frequency respectfully. The steps required to overtake this simulation will be described. MATLAB Simulink simulation software will be used to implement the model. The model is sensitive to parameters calculated from the equations of the system design of heavy duty gas turbine model provided by William Rowen. The parameters must be adjusted and validated according to established work for the best accurate representation of turbine output power and exhaust temperature values. Furthermore, a techno-economic assessment tool, the levelized cost of electricity (LCOE) will be calculated to present the best choice. This simulation and comparison will provide valuable information for electricity suppliers and national policymakers in the UAE to consider upgrading current working power plants with new gas turbines for improved power output and efficiencies.

[6286] *Innovative development of the regions in the context of specific taxation of energy industries*

Irina Filimonova (Institute of Economics and Industrial Engineering of SB RAS), Anna Komarova (Institute of Economics and Industrial Engineering of SB RAS) and Sofia Basov (NSU).

The purpose of this study is to assess the impact of tax expenditures carried by the state in form of tax incentives for the fuel and energy sector on stimulating the innovative development of the oil-producing regions of the Russian Federation. This study applied the cluster analysis using Ward method to the 32 oil producing regions of Russia with regards to 7 innovation indicators and 5 indicators representing types of tax incentives. Based on the results of clustering of oil producing regions, two groups with high and low innovation potential were identified in terms of the impact of tax expenditures on their innovative development. Results proved that, on average, regions with high state tax expenditures have higher values of innovation indicators. The study of the impact of tax incentives on MET for the companies which at the same time represent state tax expenditures is important in the context of innovative development of the oil-producing regions of Russia. MET tax incentives are determined by the degree of depletion of oilfield, the complexity of extraction and other production and regional factors. Providing such incentives can encourage companies interested in increasing production to conduct R&D studies and introduce innovations in the field development process.

[6408] *Manufacturing and Study of the Characterization of POT/MWCNT/PS Films to Use as Gamma Dosimeter*

Hadeel Hamad (Ministry of Education: Directorate of Education of First Karkh, Baghdad, Iraq), Hadi Mohammed (Ministry of Education: Directorate-General for Education Dhi Qar, Iraq) and Tariq Alwan (Mustansiriyah University, College of Education, Physics Department, Iraq).

In this study, Poly(O-toluidine)/Multi-Walled Carbon Nanotube/Polystyrene (POT/MWCNT/PS) films were prepared by casting and irradiated with different doses of gamma rays (0, 3, 5 kGy) at room temperature to manufacture a polymer gamma ray dosimeter. The effect of these rays on the physical properties of the samples was investigated in terms of their structure, morphology, optical, and electrical conductivity. The effect of irradiation on the morphology of the prepared films and their crystal structure was explored by scanning electron microscopy and X-ray diffraction. The electrical conductivity of unirradiated POT.MWCNT/PS films increased from 1.89×10−8 S/cm to 5.61×10−8 S/cm after exposure to 5 kGy dose gamma irradiation. The absorbance and transmittance spectra of POT.MWCNT/PS films were recorded. An analysis of these spectra shows that the optical transitions are an allowed direct transition and the irradiation increases the value of the optical energy gap. The above influences on the physical properties of POT.MWCNT/PS films due to gamma rays make them a candidate for use as a gamma ray detector.

[6435] *Rice Mechanization in Ethiopia: Trends, and Prospects*

Dessye Belay (Ethiopian Institute of Agricultural Research(EIAR), Fogera National Rice Research and Training Center (FNRRTC)) and Laike Kebede (Ethiopian Institute of Agricultural Research(EIAR)).

Abstract The domestic rice industry of Ethiopia is highly constrained by low productivity, poor quality, and old processing machines. The rice production system of Ethiopia was done by hand or with rudimentary tools, as well as traditional animal-drawn implements. Even on a hiring basis, only 2% of households have access to tractors. Weeding is also a very labor-intensive activity among other farm operations in rice production, which is performed in three stages. The total labor demand is estimated to be 175 labor days and constitutes 66% of the total labor for various farm operations. Rice harvesting is done manually using a serrated sickle for cutting the standing crop and collecting and piling it manually. Farmers are responsible for most of the pre-milling operations, with 78.8% of the farmers selling unprocessed rice. Most farmers commonly store paddy for household consumption in local stores. The major challenges are fragmented farm holdings, poor marketing channels, and a lack of awareness of post-harvest utilization. Despite this, there are opportunities that can be expected to assist in the development of rice mechanization research and development. Besides, prospects are also drawn for the rice mechanization development in Ethiopia, which are: improving the rice mechanization research system; training local entrepreneurs; repair and maintenance services; promoting custom hiring centers and service providers; local manufacturing of farm implements; organizing agricultural cooperatives; landholding and landownership structures; assessing foreign experience; linking importers and service providers; and encouraging investments in the rural infrastructure are recommended.

[6519] *Numerical Modeling of Urban Heat Island Effects Phenomena: A Case Study of the Green City of Ben Guerir, Morocco.*

Houda Er-Retby (Mohammed VI Polytechnic University, Green Energy Park (IRESEN,UM6P)), Abdelkader Outzourhit (Mohammed VI Polytechnic University, Cadi Ayyad University), Mohamed Oualid Mghazli (Green Energy Park (IRESEN,UM6P), ENTPE, LTDS), Abdellah Nait-Taour (Technical University of Munich, Green Energy Park (IRESEN,UM6P)), Hicham Mastouri (Mohammed VI Polytechnic University) and Mohamed El Mankibi (ENTPE, LTDS, Green Energy Park (IRESEN,UM6P)).

A better understanding of the urban heat island (UHI) effect has heightened interest in measuring, assessing, and modeling the outdoor thermal environment in urban areas around the world. Its modeling is currently becoming crucial for urban planning and design which facilitates the analysis of the phenomena. To get around this topic, this paper investigates the heat profile in a new urban area located in a vast semi-desert region characterized by a hot Mediterranean climate and how green spaces affect the outdoor thermal environment. In this work, we used two approaches: first, we created an urban weather generator workflow using the visual programming software Grasshopper to estimate a city's thermal conditions using many key geometric and material parameters of the urban landscape, such as buildings height, albedo, surface properties (roads, roofs, and walls), and heat traffics; after that the obtained weather file was used to map the heat using the universal thermal climate index (UTCI), which is strictly for outdoor spaces and takes into consideration the air temperature, mean radiant temperature, humidity, wind velocity, and solar radiation of the studied area. The outcoming results demonstrated that the value of the UTCI in the urban area without green space could reach 36°C in the hottest month of the year, whereas the modeling of the urban area with green spaces helped to reduce the value of the UTCI by 7°C to reach 29°C.

[6522] *Comparison of the input filter effect to PV panel by SEPIC MPPT converter*

Erdal Şehirli (Kastamonu University).

PV panel with front end converter used as a MPPT converter is always used for solar energy. The current that front end converter draws from PV panel are generally includes ripple regarding to operation mode of the converter and type of converter. Such current ripple when it has higher magnitude is so harmful for the PV panel, it either shortened lifetime or results faults on PV panel. To overcome such drawbacks, input filter must be used with front end converter for PV panel connection. Although, in the literature, there are a few types of input filter, the effect of the filter and input current ripple and current noises are not compared for PV panel integration. As an input filter, LCL, LCL with damping, LC, C filters are used, and their effects are compared with PV panel. In addition, as a front-end converter SEPIC converter is chosen because of having lower or higher output voltage regarding to input voltage. By means of the applications with up to 15 W SEPIC converter and simulations, it is shown that LC filter ensured better results with DC source from applications. However, C filter is better for PV panel by simulations it is because PV panel exhibits current source character, also LCL with damping filter transfers higher energy to the load than the others

---

[6524] *Analysis of X-ray diffraction lines of Cuprous Oxide nanoparticles by using variance analysis method*

Karrar Alsoltani (Department of physics, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Iraq) and Khalid Harbbi (Department of physics, College of Education For Pure Science (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq).

. In this study, the results of x-ray diffraction methods were used to determine the Crystallite size and Lattice strain of Cu2O nanoparticles then to compare the results obtained by using variance analysis method, Scherrer method and Williamson-Hall method. The results of these methods of the same powder which is cuprous oxide, using equations during the determination the crystallite size and lattice strain ,It was found that the results obtained the values of the crystallite size (28.302nm) and the lattice strain (0.03541) of the variance analysis method respectively and for the Williamson-Hall method were the results of the crystallite size (21.678nm) and lattice strain (0.00317) respectively, and Scherrer method which gives the value of crystallite size is (16.91908 nm) and lattice strain is (0.007632).

[6559] *Effect of Beef and Chicken Manure Compost on the Nutritional Content of Calcium and Phosphorus in Alfalfa*

Néstor León-Teran Néstora (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Ivan Garcia-Huertas (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Merardo Quezada-Alvarez (Departamento de Ingeniería Ambiental. Universidad Nacional de Trujillo, Trujillo, 13011, Perú), Magda Rodriguez-Yupanqui (Escuela de Ingeniería Ambiental, Facultad de Ingeniería, Universidad Cesar Vallejo, Trujillo, 13007, Perú), Segundo Rojas Flores (Vicerrectorado de Investigación, Universidad Autónoma del Perú, Lima 15842, Perú), Renny Nazario-Naveda (Vicerrectorado de Investigación, Universidad Autónoma del Perú, Lima 15842, Perú) and Luis Cabanillas-Chirinos (Institute for Research in Science and Technology, Universidad Cesar Vallejo, Trujillo 13001, Peru).

The general objective of this thesis was to determine the effect of beef and chicken manure compost on the nutritional content of calcium and phosphorus in alfalfa; the research was of experimental design and applied type; The following results were obtained related to the physical-chemical characteristics of the compost based on bovine manure, temperature of 25°C, pH of 7.8 and the concentration of nitrogen (1.44%), phosphorus (0.57%) and potassium (1.80%), while for the chicken manure-based compost a temperature of 27°C, pH of 7.5 and a concentration of nitrogen (1.80%), phosphorus (1.05%) and potassium (1.24%) were obtained. Where it can be deduced that the compost based on chicken manure contains a higher concentration of nitrogen and phosphorus. Finally, the values obtained in the loam soil applying compost based on bovine manure were 3.97% calcium and 0.39% phosphorus and in the sandy soil 3.35% calcium and 0.37% phosphorus were obtained in alfalfa; Therefore, it is concluded that applying compost based on bovine manure, better results are obtained in sandy and loamy soil, increasing the nutritional content of calcium and phosphorus in alfalfa.

[6858] *Comparative mass transfer performance of CO2 absorption using highly-concentrated AMP-PZ-MEA ternary amines solvent*

Sukanya Nakrak (Chulalongkorn University), Benjapon Chalermsinsuwan (Chulalongkorn University), Paitoon Tontiwachwuthikul (University of Regina), Hongxia Gao (Hunan University), Zhiwu Liang (Hunan University) and Teerawat Sema (Chulalongkorn University).

Mass transfer performance of CO2 absorption is based on selecting an effective amine solvent, hence, an examination of the overall mass transfer coefficient (KGav) and CO2 removal efficiency, is significant for obtaining the most favorable CO2 capture performance. This study compared KGav and CO2 removal efficiency of the highly concentrated ternary amines solvent at various concentrations with the benchmark monoethanolamine (MEA) in a laboratory scale CO2 absorption packed-column. The six blends of 2-amino-2-methyl-1-propanol (AMP), piperazine (PZ), and MEA are formulated as ternary solvents at high PZ/AMP molar ratio (1.25-3.75) and total amine concentration (6M and 7M). Be noted that the solvent precipitation was not observed in this study. The absorption experiment was operated at 303 K temperature, 12% CO2 by volume, and CO2 loading of 0.25 mol CO2/mol amine. The experimental results showed that KGav and CO2 removal efficiency for AMP-PZ-MEA and MEA solvents increased as total amine concentration increased. Also, KGav and CO2 removal efficiency of the PZ-AMP-MEA solvent are greater than those of 5M MEA. An increase of PZ/AMP molar ratio had a positive influence on the absorption performance for ternary amines. In comparison with the benchmark 5M MEA, all the studied AMP-PZ-MEA solvents showed an outperformance. The two suggested formulae, which are 0.95:3.55:1.5 (6M) and 0.95:3.55:2.5 (7M), possessed approximately 1.5 and 2.5 times higher KGav and 17.34% and 17.63% greater CO2 removal efficiency compared with the benchmark 5M MEA.

[6946] *The modern issues of the solar renewable energy*

Michael Fratita (“Dunarea de Jos” University of Galati), Florin Popescu ("Dunarea de Jos" University of Galati) and Eugen Rusu (Dunarea de Jos University).

This paper presents the current policy context that encourages the use of renewable energy sources given unstable electricity prices in Europe. The evolution of the technologies used to manufacture photovoltaic panels has made their performance increase in recent years and their price affordable. The instability of electricity prices and attractive prices are the main reasons why many domestic electricity consumers are installing photovoltaic panels on the roofs of their houses or on the ground, thus becoming electricity producers. These panels will support the electricity needs of the home and the excess production can be stored in batteries or fed into the grid for neighbours. The paper also presents a scenario that could lead to grid instability in the event of an overproduction of electricity produced by photovoltaic systems feeding electricity into the grid.

[6997] *Effect of Gold Nanoparticles Synthesis by Plasma Jet Scheme on normal cell lines*

Tanya Jabbar (College of Medicine\Al-Mustansiriya University), Zainab W. Abdul Lateef (College of Medicine\Al-Mustansiriya University) and Ban H.Adil (College of Science for Women\University of Baghdad).

New evidence on nanotechnology has shown interest in the creation and assessment of nanoparticles for cancer treatment. Worldwide, a wide range of tumor-targeted approaches are being developed to reduce side effects and boost the efficacy of cancer therapy. One strategy that shows promise is the use of metallic nanoparticles to increase the radiosensitization of the cancer cells while reducing or maintaining the normal tissue complication probability during radiation therapy. In this study, atmospheric plasma was created using argon gas to create Au NPs using the plasma jet scheme, and their ability to induce apoptosis as an anticancer mechanism was tested. Aqueous gold tetrachloride salts (HAuCl4•3H2O) were used to produce gold nanoparticles. For conformations, various techniques were used to explore the characterization of Au NPs, included UV–Vis spectroscopy, X-Ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (FE-SEM),). UV–vis spectroscopy showed The maximum absorption peaks located between 520 and 530 nm. The peaks of XRD 2θ are observed at 38.8°, 44.47° , 64.4° and 77.17° .They correspond to the 111, 200 , 220 and 311 crystalline levels respectively. The peak intensity (111) at 38.8° diffraction was maximum peak . the image of FESEM showed that the Au NPs which produced are irregularly shaped spheres with sizes ranging between 41-46 nm. The effect of nanoparticles on REF normal cell lines was studied to calculate cytotoxicity and the greatest rate of destruction of REF normal cell lines was 22.667% after incubation time 72 hour after exposure to the combination of irradiated gold nanoparticles-cisplatin with 50 Gray photon X-ray and 1 µg of cisplatin and the minimum was 0.7% after incubation time 24 hour after exposure to the combination of irradiated gold nanoparticles-cisplatin with 0.5 Gray photon x-ray and 0.025 µg of cisplatin. Its possible to enhance chemotherapy treatment by these nanoparticles, In the future these techniques will be possible to used for kill cancer cells, especially after showed low toxicity on normal cells.

[7101] *Energy Potential of an Operating Slaughterhouse*

Moses Kabeyi (Durban University of Technology) and Oludolapo Olanrewaju (Durban University of Technology).

In this study, the performance of an operating biogas plant using slaughterhouse waste was carried with the view of improving its operation and hence protect the environment from pollution coming from slaughterhouse waste. This research was conducted through site visits, observations, oral interviews, and document reviews. It was established that the existing biogas plant was not performing as expected. The study showed that the biogas plant performance is about 72.9% of the optimum production. The biodegradable waste is also underutilized since only 5% of the available waste is used while 95% is not digested and hence is released to the environment leading significant pollution of Nairobi River. It was observed that the substrate to water mixing ratio used 1:2.5, temperature in the digester averaged 34°C, average pH of the substrate was 6.5 and the pressure was 400 mm of water. These parameters were regarded as outside the optimum production range. Modification on the plant was therefore proposed based on the analysis done. The proposed new biogas plant design is expected to increase slaughterhouse waste utilization, increase biogas production and electricity potential, and reduce environmental pollution. The new biogas plant design has a 1600m3 digester with an expected daily biogas output of 1920m3 and slaughterhouse waste utilization will increase to 92.86%.

[7209] *CNN-based, Contextualized, Real-time Fire Detection in Computational Resource-Constrained Environments*

Eleni Tsalera (University of West Attica), Andreas Papadakis (School of Pedagogical and Technological Education), Ioannis Voyiatzis (University of West Attica) and Maria Samarakou (University of West Attica).

The increasing occurrence of wildfires, amplified by the changing climate conditions and drought, poses threats to human lives, the environment and the geographically dispersed infrastructures. Such impact necessitates the prompt identification of wildfires so that appropriate countermeasures are taken. The availability of electronic equipment, such

as Unmanned Aerial Vehicles, allows for images from dynamically changing, geographical areas, which must be directly processed for wildfire identification and contextualization. In this work, we identify the requirements and the constraints in terms of computational resources of this workflow, and investigate lightweight CNNs to be used. SqueezeNet, ShuffleNet, MobileNetv2 as well as ResNet50 are used for fire identification. To simulate the realistic conditions, we have investigated multiple datasets, selecting Forest-Fire and Fire-Flame datasets and images from 3rd party sources and performed cross-dataset identification evaluation. To rationalize the required computational resources and the operation cost, lightweight networks have been selected and compared with ResNet-50, which is more complex. The contextualization, i.e. the detection of elements related to energy infrastructures, has been based on image semantic segmentation, performed through ResNet-18. The identification results, expressed as classification accuracy has reached 96%, with satisfactory results in the cross dataset scenarios, while we have identified five classes from the CamVid dataset which can be used for the contextualization needs.

[7272] *Experimental and Modelling Study of Steam Fluidized Bed Gasification using Raw and Torrefied Empty Fruit Bunch*

Najwa Hayati Abdul Halim (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang), Suriyati Saleh (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang) and Noor Asma Fazli Abdul Samad (Faculty of Chemical & Process Engineering Technology, Universiti Malaysia Pahang).

An experimental study of bubbling fluidized bed gasification using raw and torrefied empty fruit bunch (EFB) as feedstocks has been performed for producing synthesis gas. The objective of this work is to investigate the effect of gasification temperature and steam to biomass ratio (SBR) on the production of the synthesis gas and gasification performances. Using steam as gasifying agent, the gasification experiments were carried out at temperatures from 600 to 1000 °C and SBR from 0.3 to 1.0 in order to study the effect of torrefaction on gasification performances. The composition of the synthesis gas which consists of hydrogen, carbon monoxide, carbon dioxide and methane gases were measured from gasification experiments. Moreover, synthesis gas yield, lower heating value (LHV), cold gas efficiency (CGE) and carbon conversion (CC) were calculated in order to evaluate the gasification performance. From gasification experiments, hydrogen gas is increased with rise of gasification temperature and SBR. Meanwhile, the composition of methane obtained shows decrement value when temperature and SBR were increased. The highest value of synthesis gas yield of 1.62 Nm3/kg is obtained from gasification of torrefied EFB at SBR 1.0 and temperature 900 °C. Meanwhile, LHV of raw EFB increased from 7.35 to 8.59 MJ/Nm3 when temperature was increased. However, when SBR was increased, the LHV showed an opposite pattern which decreased from 8.93 to 7.16 MJ/Nm3. In terms of CGE and CC, all feedstocks show increment trends with rise in gasification temperature and SBR. Furthermore, EFB sample underwent torrefaction process at higher torrefaction temperature and residence time obtained higher synthesis gas yield and better gasification performance. In addition, eight multivariable linear regression (MLR) models were developed to predict the composition of the synthesis gas (hydrogen, carbon monoxide, carbon dioxide and methane), synthesis gas yield, LHV, CGE and CC. The proximate analysis, HHV, gasification temperature and steam biomass ratio were used as independent variables to develop the models. The results show high reliability of developed MLR models where regression coefficients >85% were obtained.

[7291] *Algorithm of short-circuit type identification based on fuzzy logic*

Yermek Sarsikeyev (Kazakh Agrotechnical University named after S. Seifullin), Gulbakyt Ansabekova (Kazakh Agrotechnical University named after S. Seifullin), Ruslan Ufa (National Research Tomsk Polytechnic University) and Zhubanysh Abdimuratov (Kazakh Agrotechnical University named after S. Seifullin).

Electric power systems (EPS) play an important role in the development of the economy of each state. The efficiency of their work is reflected in the technical and economic indicators of transportation and distribution of electricity. The reliability of the EPS, which implies the ability to perform given functions with given constraints in normal and abnormal operation modes, is most significant criterion of effectiveness. Among the abnormal operating modes, short circuits, resulting from internal damage and/or external influences, are the most frequent and with the most severe consequences. In this paper the results of analysis of oscillograms and vector diagrams of currents and voltages for a 110 kV electric network in normal, emergency and post-emergency modes of operation are presented for the purpose of development of new algorithm of short-circuit type identification based on fuzzy logic. In particular, it should identify a single-phase short-circuit as one of the most common and severe types of short circuits. Compare with traditional methods the proposed identification algorithm there is no need to calculate the parameters of relay protection devices for a given scheme and its characteristics. Because the existing protection system in EPS has a complex relationship and hierarchy, both between the types of protections and between their parameters, which are adjusted personally for each possible case. The idea of the work is to use the theory of symmetrical components of currents in normal operation and in short-circuit mode, estimating the magnitude and rate of change of positive-, negative- and zero-sequence currents in all phases. Thus, fuzzy logic techniques, which have proven themselves for solving problems of medium complexity and

deterministic on the principle of "if-then", are used. Based on experimental data and comparative computer modeling, the linguistic input and output variables and their membership functions were determined. A database of rules for output variables depending on the set of membership functions of the input variables was formed. Tuning, defuzzification and analysis of algorithm adequacy were performed. The developed algorithms was tested in the studied scheme of EPS under different type of short-circuit. The obtained results show that the algorithm has demonstrated its performance, the accuracy of determining the type of short-circuit which depends on the type of term (triangle, trapezoid, etc.). So, the application of the proposed algorithm for identifying the type of short-circuit can increase the speed of the protection devices, identification of short-circuit type and also simplify the parameter setting process of the protection devices.

[7319] *Analyzing and Simulate the Near-Mid Field Propagation for a Gaussian Beam of X-Ray Laser*

Mohammed Saleh (College of Education for pure Science-Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq) and Thair Alaish (College of Education for Pure Sciences Ibn Al-Haitham).

Gaussian beam propagation of the Free Electron Laser (FEL) through the atmosphere is a very important topic for many vital applications in the military, scientific, and medical fields, where laser beam spot size and final power are extremely important requirements in most laser applications. The propagation of a Gaussian laser beam in the atmosphere is subject to attenuation processes that affect the laser beam. From the results, simulations of the free electron laser system showed that an X-ray laser with a wavelength of 0.50418 nm can be produced with an energy beam of 200 PJ. The M2 quality factor will increase with the propagation distance, determining the final laser spot size. As a result of the attenuation processes, there is a slight loss in the final energy of the laser as well as divergence in the laser beam that reaches the target. The amount of attenuation is highly dependent on the density of the atmosphere and the size of the laser spot. When the laser beam propagates in the near-field (less than 20 m) or mid-field (20–100 m) horizontally and vertically at sea level, the values of the attenuation coefficient when propagating in the horizontal direction are greater compared to the propagation in the vertical direction.

[7341] *SYNGAS analysis of the plasma gasification feeded by hazardous waste*

Pedro Pitrez (Faculty of Engineering of University of Porto), Eliseu Monteiro (Faculty of Engineering of Unversity of Porto) and Abel Rouboa (Faculty of Engineering of University of Porto).

This paper presents an improved computational model that replicates a thermal treatment system for COVID-19 wastes using plasma gasification in Aspen Plus. The distinctive aspect of the present plasma gasification model is the inclusion of an extra Gibbs reactor in order to enhance the calorific value of the syngas. The model validation results shows an increase in the CO and CH4 molar fractions and a deacrease of the H2 and CO2 molar fractions, which allows to increase the calorific value of the syngas from 4.97 to 5.19 MJ/m3. The most common types of hazardous waste generated during the pandemic were determined to be masks and syringes. COVID-19 waste from Turkey, discarded masks from Indonesia, Korea, and Lithuania, and Chinese syringes were used as feedstock into the computational model. The results suggest that the hazardous waste that allows for higher hydrogen molar fractions is Korean masks. On the other hand, the highest carbon monoxide molar fractions are obtained with medical waste from Turkey, while the highest molar fractions of methane are obtained with medical waste from Lithuania. A conclusion could be drawn that the lowest syngas calorific value is obtained with medical wastes from Turkey, while the highest syngas calorific value is obtained with medical wastes from Korea.

[7406] *Public Charging Infrastructure for EVs: A Comprehensive Analysis of Charging Patterns & Real-world Insights – Case Study of Rabat City, Morocco*

Abdelilah Rochd (Green Energy Park / IESI Laboratory, ENSET Mohammedia, Hassan II University of Casablanca, Morocco), Mohamed Laamim (Green Energy Park / LSIB Laboratory, FST, Hassan II University of Casablanca, Morocco), Aboubakr Benazzouz (Green Energy Park), Mohamed Kissaoui (IESI Laboratory, ENSET Mohammedia, Hassan II University of Casablanca, Morocco), Abdelhadi Raihani (IESI Laboratory, ENSET Mohammedia, Hassan II University of Casablanca, Morocco) and Hongjian Sun (Department of Engineering, Durham University).

The introduction of electric vehicles (EVs) will contribute to decarbonizing our cities and make them more sustainable, which will help mitigate climate change. To ensure a successful transition to e-mobility, charging infrastructure development is considered an essential pillar. This paper presents a comprehensive analysis of electric vehicle supply equipment (EVSE) usage. It aims to understand charging patterns in urban environments and retrieve some real-world insights. By collecting a 2-years historical dataset (from 2019 to 2021) of a public EVSE based in Rabat, the methodology presented in this study covers time evolution assessment, energy delivery analysis, and users' behavior characterization.

The analysis of about 2835 events showed that the average energy delivery is 12 kWh corresponding to an average charging duration of 48 min. The performed analyses resulted in various findings that led to a set of recommendations that could be insightful for different types of stakeholders (policymakers, grid operators, charging operators, EV drivers, etc.). Furthermore, the methodology followed in this work is reproducible and may be used as a reference for other EVSE usage analyses.

[7477] *Experimental Validation of the Performance Enhancement of PV Systems Based on Neuro-Fuzzy MPPT Controller*

Salal Anis Krim (University of Sétif1), Fateh Krim (University of Sétif 1) and Hamza Afghoul (University of Sétif 1).

Among the various renewable energy sources, photovoltaic (PV) systems have recently emerged as the most promising. Owing to the PV generator's dependence on solar radiation, temperature, and electrical charges, a common issue is that the PV system has relatively low conversion efficiency. Solutions based on Maximum Power Point Tracking (MPPT) technologies can increase this efficiency. This work compares experimentally the dynamic performance of incremental conductance technique with fuzzy and neuro-fuzzy controllers to track the maximum power point for photovoltaic (PV) energy systems. To deliver maximum power, a boost converter is inserted between PV generator and the load for power adaptation. It is shown that neuro-fuzzy control outperforms fuzzy control and hill-climbing maximum power point tracking (MPPT) technique such as incremental conductance (InCond) method in terms of tracking speed, tracking accuracy, steady-state efficiency and stability at all operating conditions. Thus experimental validation on a dSPACE 1104 board confirms the superiority of neuro–fuzzy MPPT over conventional methods.

[7478] *MSMA: A Modified slime mould algorithm for solving energy demand estimation problem: A case study of Turkey*

Murat Aslan (Şırnak University) and Mehmet Beşkirli (Karamanoğlu Mehmetbey University).

The energy demand estimation problem is being a major problem for all countries. Because, energy has a vital role for social, economic or environment growth of the nations. Therefore, long-term energy demand estimation problem is one of the important issue for all countries in order to make future plans. In this study, six different SMA methods such as SMA-Linear, SMA-Quadratic, SMA-Exponential, MSMA-Linear, MSMA-Quadratic and MSMA-Exponential are proposed for solving Turkey's long-term energy demand estimations for the years 2021-2050. The experimental results of basic SMA is not very effective for the problem dealt with this study. Therefore, a modified version of SMA (for short MSMA) is proposed for increasing the exploration and exploitation capability of the SMA method. In the proposed algorithm, some new update rules are integrated into the current update rule of basic SMA. In addition, in each iteration of basic SMA, although the fitness value of new position worse than the previous one, the position of each member in slime mould population are always being updated. In order to defeat this restriction, a greedy selection mechanism is integrated into proposed algorithm, and each position of the slime mould population is updated according to the proposed greedy selection mechanism. And also a diversity (d) parameter is included into position update rule. Turkey's observed energy demand (OED), population, gross domestic product (GDP), export and import historical records taken from Turkish statistical institute (TUIK) and the ministry of energy and natural resources (MENR) for the years 1997-2020 have been used for creating the estimation models. First, the models are created with SMA and MSMA methods, then long-term energy demand estimations are made with three different scenarios for the years 2021-2050. According to the experimental results, MSMA-Quadratic methods is produced better or comparable performance on the problem dealt with this study in terms of solution quality and robustness.

[7596] *Hyperspectral Pansharpening Improvement using MNF Transformation*

Rawnak Abdulwahab (Al-Nahrain University-collage of science), Laith Al-Ani (Physics Dept., College of Science, Al-Nahrain University, Baghdad, Iraq) and Auday Shaban (College of science, University of Baghdad, Baghdad, Iraq.).

Hyperspectral sensors produce images with great spectral resolution at the loss of spatial resolution, which limits their ability for precise and further application. Hyperspectral pansharpening techniques combine images jointly acquired by two different sensors, a panchromatic one providing high spatial resolution and a hyperspectral one providing high spectral resolution, to create an image with both high spatial and spectral resolutions because the latter cannot be provided simultaneously by current sensors. In this research three pansharpening techniques were adopted for 175 preprocessed hyperspectral bands with 30 m spatial resolution to upgrade it to 15 m. these techniques were Principal Components Analysis (PCA) Gram-Schmidt algorithm (GS), and Nearest Neighborhood Diffusion (NND).which was the first stage in the work , the second stage was implement MNF transformation to reduce the dimension while conserve all the details, that it reduced bands to 130 and implement fusion methods which lead us to the third stage in reducing the bands to 60 bands depending on their eigen values. However, PCA fusion saved the spectrum and produced good details

in the results as GS does by evaluating the quality of fused image visually and NND technique showed the less improvement. The other way of thoughts, quantitative analysis determines the performance of the fused image to compare it with HS and PAN reference images by compute the RMSE, MAE and EGRAS with HS original and PAN original.in addition we calculate the STD and HF for fused image, however the fused imaged improved a lot by MNF transformation on 60 bands only.

[7679] *Physical Properties for Biomaterials Docking with Bones and Articular Cartilage*

Bahjat Kadhim (Mustansiriyah University) and Sarah Athari (Mustansiriyah University).

Poly methyl methacrylate supported by 10 Volume fraction (zirconia, Titania, alumina) nanoparticles. The synthesis of nanocomposite specimens in terms of the volume fraction change of nano hydroxyapatite (0,1,3,5,7,9) Volume fraction was carried out through technological processes to obtain the nanocomposites. Disc-on-disc method was adopted for wear and friction coefficients calculations according to standard conditions, by using a smooth steel disc as a counter face with a continuous load of 90 Neutons for one hour. Hardness and density were used to help discuss the results. The biological tests, include the examination of the specimens in simulated body fluid mixed with plasma riches palette . The specimens were placed and immersed in simulated body fluid mixed with plasma for 60 days. The results showed that the coefficients of friction and wear were improved with elevating the volume fraction of hydroxyapatite which reached (friction = 0.0781781) and (wear = 0.2698059 × 10-7). It can be concluded from the results that the nanocomposites were suitable as rebuild articular cartilage as well as orthopedic and prosthetic biomaterials in medical applications

---

[7781] *Energy Consumption, Economic Growth and Environmental Sustainability: Evidence from China*

Gaolu Zou (Chengdu University) and Kwong Chau (University of Hong Kong).

This paper mainly investigated the interactions between energy consumption, economic growth, and the environment in China. The carbon dioxide emission intensity variable was introduced to represent the environmental variable. Data covered the period from 1965 to 2016. Coal, oil, and hydroelectricity use, real gross domestic product, and the environment were cointegrated. Coal, oil, and hydroelectricity consumption and real GDP were weakly exogenous but emissions were not. In the long run, a 1% increase in hydroelectricity consumption reduced CO2 emission intensity by 2.15%. However, a 1% increase in coal and oil consumption increased CO2 emission intensity by 2.89% and 0.76%, respectively. The impact of coal consumption on emissions is much larger than that of oil consumption. Coal and hydroelectricity consumption appeared to have a lagged effect on carbon emissions. Also, in the long run, coal, oil, and hydroelectricity consumption had impacted GDP and vice versa. The economy appeared to heavily depend on coal consumption. The study suggests a positive long-run unitary relation between oil consumption and the economy. Real GDP positively impacted CO2 intensity in the short run but the long-run effect was negative. This result is consistent with the post-materialist value theory and prosperity hypothesis, both of which imply that people's environmental concerns will increase as income increases. Therefore, reducing carbon emissions can be achieved without sacrificing economic growth in the long run

---

[7835] *Statistical Analysis of Dust Storms over Iraq in the Last Four Decades from 1980 to 2018*

Aws Al-Khudhairy (Al Mustansiriyah University), Yaseen Al-Timimi (Department of Atmospheric Science, College of Science, Mustansiriyah University, Baghdad, IRAQ.) and Auday Shaban (Department of Remote Sensing & GIS, College of Science, University of Baghdad, Baghdad, IRAQ.).

The analysis of the spatial and temporal dust storms and their trends is very important for climate change where dust storms consider a significant environmental problem and one of the most effective meteorological phenomena that affect climate change, deforestation and drought, which are reflected on the human health, economic aspects. This research aims to investigate trends of numbers of dust storms and their behavior in thirteen meteorological stations spreads all over Iraq for the period 1980-2018. The trends of Dust storms included monthly data of dust storms occurrences which were analyzed spatially and temporally using the linear regression method, and spatially represented by using ArcGIS. Nonparametric statistic was applied to determine the significance of the trends. Generally, the months (April May June) have the most occurrence values which mean it occurs between springs and summer seasons. Annual analysis is indicated that highest number of dust storms occurrence happens in Nasiriya, Kerbela, Baghdad, stations respectively. In the summer season eight of the thirteen stations which are (Mosul, Kirkuk, Romadi, Baghdad, Koot Al Hai, Najaf, Diwaniya and Semawa) show a significant positive trend (Increasing) during the study period while the other five stations show a negative trend (Decreasing). Annually, the behavior of the number of dust storms for the thirteen stations shows that five of the thirteen stations which are (Kirkuk, Romadi, Koot Al Hai, Najaf and Semawa) show a

significant positive trend (Increasing) during the study period while the other eight stations show a negative trend (Decreasing).

[7863] *Preparation and study of structural properties, transition temperature and thermal conductivity of the HgBa2Ca2Cu3O8+δ and HgBa2CaCu2O6+δ Nanomaterial compounds*

Fouad Ali (Physics department, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq.) and Kareem Jasim (university of Baghdad/ college of pure science Ibn Alhaitham/ Country. Iraq).

In this paper, using the solid-state reaction technique, high-temperature nanomaterial's superconductors HgBa2Ca2Cu3O8+δ and HgBa2CaCu2O6+δ, have been effectively created. At 850 °C, samples were sintered. By calculating the current and voltage as a function of temperature using the four probes method to determine the transition temperatures Tc(onset) and Tc(offset), the continuous electrical properties were explored. Where it was discovered that for the HgBa2Ca2Cu3O8+δ compound, the electrical resistivity has a gradient Tc(onset) (the beginning) at 145 K but zeroes out at Tc(offset) = 128 K. The temperature Tc(onset) (beginning) for the HgBa2CaCu2O6+δ compound was 137 K, whereas the temperature Tc(offset) was zero at 115 K. Using a Lee disk, thermal conductivity was measured. It was found that the thermal conductivity increased in direct proportion to temperature. The sample of the compound (HgBa2Ca2Cu3O8+δ) (Hg-1223) has a curve that begins at a temperature (40 ° C), thermal conductivity (0.878970388), and ends at a point (0.901118234) with a temperature (280 °C). This curve is higher than the curve of the compound (HgBa2CaCu2O6+δ) (Hg-1212) has a curve that begins at a temperature (40 ° C), thermal conductivity (0.878027444), and ends at a point (0.895530) with a temperature (280 °C). In order to analyze the structural qualities, X-ray diffraction analysis was used. The findings demonstrated that both compounds have a tetragonal crystal structure with distinct differences in the crystal lattice characteristics.

[7951] *Communication system between Russian energy companies and the Indigenous peoples of the North*

Vladimir Klepikov (National Research University Higher School of Economics) and Liubov Vladimirovna Klepikova (Russian University of Transport (MIIT)).

The regions of activity of energy companies are also the traditional areas of residence of the Indigenous peoples of the North (IPN). Commercial activities in these territories violate the environment and adversely impact the lives of the IPN. This study seeks to fill a gap regarding the position the IPN take while communicating with energy companies and the representative image the energy companies hold of the IPN. We consider the complex process of communication between oil companies and the IPN; the role assigned to the IPN in this process; the strategies adopted to preserve the IPN and why these strategies are prioritized; and the implications of the concept of "traditional life" of the IPN for each of the participants in the communication process. We analyzed the period 2010–2020 as it reflects the current situation. We applied the hermeneutic method by comparing data from the reports of Gazprom, Lukoil, and Rosneft; analyzed documents related to the socio-economic development of the respective Russian regions; and used information from the official websites of organizations representing the interests of the IPN. In the complex system of interaction between energy companies and the IPN, the latter, on the one hand, acts as a homogeneous unity, as differentiation between groups of people is rarely carried out. On the other hand, the interpretation of the identity of the IPN occurs through "traditional culture," which is gradually equated to something that is worthy of a place in a museum. This trend is a matter of concern, as real socio-economic challenges run the risk of being overlooked in the process of musealization of Indigenous peoples.

[7962] *Determination microstructure parameters for Copper Oxide Nanoparticles*

Karrar Alsoltani (Department of physics, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Iraq) and Khalid Harbbi (College of education for pure science Ibn Al-Haitham, University of Baghdad, Iraq).

In this research, the results of x-ray diffraction method were used to determine the uniform stress deformation and microstructure parameters of CuO nanoparticles to determine the lattice strain obtained and crystallite size and then to compare the results obtained by two model Halder Wagner and Size Strain Plot with the results of these methods of the same powder using equations during which the calculation of the size of the crystallite size and lattice strain ,It was found that the results obtained the values of the crystallite size (19.81nm) and the lattice strain (0.004065) of the Halder-wagner model respectively and for the ssp method were the results of the crystallite size (17.20nm) and lattice strain (0.000305) respectively. The sample was taken into consideration In order to calculate physical and microstructural characteristics including internal strain, dislocations density, surface area, the number of unit cells, and texture coefficient.

[7984] *High throughput biodiesel production from waste cooking oil over metal oxide binded with Fe2O3*

Nattadon Pannucharoenwong (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Snunkhaem Echaroj (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand), Keyoon Duanguppama (Faculty of Engineering and Industrial Technology, Kalasin University, Thailand), Phadungsak Rattanadecho (Faculty of Engineering, Thammasat School of Engineering, Thammasat University, Thailand) and Suwipong Hemathulin (Faculty of Indstrial Technology, Sakon Nakhon Rajabhat University, Thailand).

Waste cooking oil can be converted to transportation fuel via transesterification over heterogenous high stability catalyst. This research investigated the interaction in catalyst system including magnetic and metal oxide with methanol and waste cooking oil during the transesterification reaction. Continuous reaction was performed in a glass coil under ultrasonicating system. The reaction parameters including reaction temperature, amount of catalyst, residence time and ultrasonic power were optimized. Three different catalysts including CaO/Fe2O3, ZnO/Fe2O3 and MgO/Fe2O3 were studied. The results revealed that the biodiesel yield increased with increasing reaction temperature, amount of catalyst, residence time, and ultrasonic power. However, biodiesel yield slightly decreased at reaction temperature of 75°C due to methanol evaporation. Catalyst stability was conducted on CaO/Fe2O3, ZnO/Fe2O3 and MgO/Fe2O3. At 60°C, 6 wt% CaO/Fe2O3 and 185W ultrasonic power. CaO/ Fe2O3 catalyst performed good catalytic stability to decrease only 10% of biodiesel for 34 days of time on stream. Moreover, the quality of biodiesel could meet the ASTM D6751 standard for transportation fuel.

[8087] *Heat Transfer Enhancement at Interference Zone of Twin Pulsating Circular Jets*

Ali Ahmed Gitan (Universiti Kebangsaan Malaysia), Rozli Zulkifli (Universiti Kebangsaan Malaysia), Kamaruzzaman Sopian (Universiti Kebangsaan Malaysia) and Shahrir Abdullah (Universiti Kebangsaan Malaysia).

Jet impingement heat transfer has been widely used for various heating and cooling applications due to its high heat transfer coefficients. In this study the effectiveness of pulsating jet on enhancing the rate of heat transfer of a twin pulsating jets has been investigated. The flow structure at the interference zone between twin pulsating jets could further enhance its flow turbulence and heat transfer characteristics. Hence, the main aims of this work are to investigate experimentally the characteristics of free jet flow and jet impingement heat transfer at the interference zone of the twin pulsating jets. The main parameters investigated were Reynolds number, pulse frequency, nozzle to nozzle spacing, nozzle to plate distance, and phase difference angle between the periodic pulsations of the twin pulsating jets. Flow structure of the twin pulsating jets were measured at Reynolds number of 5000 while the heat transfer parametric study was carried out at three Reynolds numbers of 5000, 7000, and 9000. The jet velocity was measured by constant temperature anemometry while the heat flux and surface temperature were measured by micro foil sensor. Velocity profile from the free twin pulsating jets characteristics study showed pulsating jet deflection at phase angle of 90o due to strong vortex formation at the interference zone with high turbulence intensity of 147 %. The interaction of factors revealed that phase angle also has significant effect on Nusselt number. The optimum conditions at maximum Nusselt number of 104.36 were found at Reynolds number of 8996, frequency of 10 Hz, normalized nozzle to nozzle spacing of 1.476, normalized nozzle to plate distance of 1, and phase angle of 90o. The percentage of Nusselt number enhancement is up to 52 % while the overall enhancement is up to 83 %. This study has shown the significant effect of twin pulsating jet in enhancing the flow characteristics and heat transfer at the interference zone of twin pulsating jet.

[8143] *EXPERIMENTAL STUDY OF THE AERODYNAMIC STABILITY OF THE SPAN UNDER WIND LOADS*

Olga Poddaeva (Moscow State University of Civil Engineering) and Pavel Churin (Moscow State University of Civil Engineering (MGSU)).

Long-span and Cable-Stayed Bridges are elastic oscillatory systems; such systems in the air flow are fundamentally non-conservative systems, i.e. Under certain conditions, such a system receives energy from the flow, which can lead to an unlimited increase in the oscillation amplitudes and, consequently, to the destruction of the structure itself - loss of aerodynamic stability. There are widely known cases of destruction of the bridge structure due to the occurrence of aerodynamic instability.The paper presents a methodology for conducting aerodynamic testing of span structures: physical testing of full-scale models of structures in wind tunnels of architectural and construction type. In accordance with the proposed method, the span structure is investigated.The tests are carried out in two stages: first - static, during which the values of lift (Cx), drag force (Cy) and aerodynamic moment (Cmz) are determined, based on the results obtained, a check is made for the possibility of galloping using the Glowert Den Hartog criterion . At the second stage, dynamic tests are carried out, during which the amplitude of oscillations for bending and torsion is determined at different wind speeds, directions of the oncoming flow.After that, conclusions are drawn about the aerodynamic stability

of the selected design. . The maximum amplitude of oscillations were determinated. According to the results of the work done according to the chosen methodology, no phenomena of aerodynamic instability of the structure were found.

[8415] *The Potential of a Tree to Increase Comfort Hours in Campus Public Space Design*

Kongkoon Tochaiwat (Faculty of Architecture and Planning, Thammasat University), Damrongsak Rinchumphu (Department of Civil Engineering, Faculty of Engineering, Chiang Mai University), Chawanat Sundaranaga (City Research and Development Center, Faculty of Engineering, Chiang Mai University), Non Phichetkunbodee (Department of Civil Engineering, National Taiwan University), Nakarin Pomsurin (City Research and Development Center, Faculty of Engineering, Chiang Mai University), Chatchawan Chaichana (Department of Mechanical Engineering, Faculty of Engineering, Čhiang Mai University), Pattaraporn Khuwuthyakorn (College of Arts, Media and Technology, Čhiang Mai University) and Ying-Chieh Chan (Department of Civil Engineering, National Taiwan University).

The rising global temperatures have led people to avoid outdoor activities, especially during the day in tropical countries, because of the high average temperatures when the comfort hours are relatively low. This problem has led to higher indoor energy consumption, health problems, and problems in social interaction. One way to encourage people to use outdoor public spaces is to design them to increase their comfort hours. This study focused on increasing the number of comfort hours through the influence of trees as one of the green infrastructure and using simulation methods in the ENVI-met program. For the simulation, we gathered field data for the correction of weather data from a weather station representing 52 weeks at the outdoor space in the Faculty of Engineering campus, Chiang Mai University, which is a target area for development from the campus policy. The alternative design was created by adding a Millingtonia hortensis, a local plant for the location. The simulation results throughout 52 weeks showed that a tree increases by 7.37% in comfort hours while an 8.65% decrease in overheating hours. This study can provide an alternative approach for designing public spaces on campuses and encourage the use of more effective design in the future.

[8424] *Green SCENT: an ongoing journey to citizen green education*

Maria Amata Garito (UNINETTUNO International Telematic University), Alessandro Caforio (UNINETTUNO International Telematic University), Andrea Falegnami (UNINETTUNO International Telematic University), Andrea Tomassi (UNINETTUNO International Telematic University) and Elpidio Romano (UNINETTUNO International Telematic University).

The Green SCENT project aims to educate European citizens to acquire green skills within the eight Focus Areas identified by the EU Green Deal Communication. The project involved 13 researchers, organised into 8 teams (one for each focus area addressed by the Green Deal communication) who worked on the project for approximately 11 months (January to November 2022). The aim of the project described in this study was to establish competences, and their specificities in terms of knowledge, skills and attitudes, creating a competence framework on sustainability issues and incorporating the feedback and insights of stakeholders by placing them as co-creators. From the developed competence framework, an interactive knowledge graph of competences was created as a practical tool to present and exploit the competence framework. This was then used to incorporate the bottom-up perspective and open up a discussion on research that hitherto had a top-down scientific approach only with competence elicited from literature data. In this paper the identified competences for the focus areas of Circular Economy, Clean Energy and Smart Mobility are used as case study. The main objective of this paper is to highlight the importance of innovative stakeholder contributions obtained through the Delphi study, the workshops and the assemblies with citizens of all ages, backgrounds and educational levels.

[8581] *A Machine Learning Approach for Time Series Forecasting with Application to Debt Risk of the Montenegrin Electricity Industry*

Milena Djukanovic (University of Montenegro, Faculty of Electrical Engineering), Ljiljana Kascelan (University of Montenegro, Faculty of Economics), Suncica Rogic Vukovic (University of Montenegro, Faculty of Economics), Ivan Martinovic (University of Montenegro, Faculty of Electrical Engineering) and Martin Calasan (University of Montenegro, Faculty of Electrical Engineering).

Level of customer electricity debts is a relevant information for the electricity production company, as it represents uncollected revenue for the provided service. Higher level of debts may affect the provider's financial stability and the ability to invest and maintain their network. On the other hand, high levels of debt may indicate larger macroeconomic problems, such as the lower standard of the citizens or high unemployment. In this paper, a Machine Learning approach for electricity debt prediction was applied, using Support Vector Regression method and data from the Montenegrin electricity provider. The obtained results indicate an excellent model performance, proving that the chosen method is an outstanding choice for this task, compared to other machine learning methods.

[8814] *Energy efficient eco-driving strategy of electric vehicles for lead vehicle following based on learning model predictive control*

Kiwon Yeom (Sangmyung University).

An automated electric vehicles (EVs) is becoming increasingly popular due to zero CO2 emission and electric energy efficiency. However, the limited energy capacity and the mileage is one of the major weakness of the EVs. Minimizing energy consumption of the EVs is a challenge problem that requires various considerations of driving environment such as car following, slope of the road, traffic signals, intersection, etc. In this paper, a novel control algorithm is proposed using Model Predictive Control for improving energy consumption of fully electric vehicles (FEVs) and Deep Reinforcement Learning (DRL) for understanding the driving environment in real-time, respectively. The dynamics of the FEVs and the brushless DC motor (BLDC) based powertrain system is applied for the reinforcement learning process and the optimal speed profile is developed by updating the approximation model through the repeated experience. The MPC algorithm is used to solve the optimal speed profile of the electric vehicles for minimizing energy consumption in a receding horizon, where the cost value of the horizon is fed into the DRL networks as observed state. The proposed scheme was tested virtually with the high fidelity car simulator (CarSim) and simulation results show the effectiveness of energy savings.

[8828] *Driving Sustainability in Logistics Value Chains: A Telematics Data Hub Implementation for Accurate Carbon Footprint Assessment and Reporting Using Global Standards-based Tools*

Kyriakos Agavanakis (ADD. Avenir Développent Durable), Robin Quitard (ADD. Avenir Développent Durable), Nikos Kousias (Emisia SA), Giorgos Mellios (Emisia SA) and Eric Elkaim (ADD. Avenir Développent Durable).

The digitalization of the global transportation and logistics sector, commonly referred to as Transportation Internet, is transforming how businesses and stakeholders in the value chains operate, perform, interact and compete. To meet market demands and regulations, transparency and interoperability are needed, especially in terms of cost, quality, planning, and environmental impact. As freight transportation has a major impact on greenhouse gas (GHG) emissions and EU aims to standardizing fuel consumption and emissions calculations at the vehicle level, we developed a cloud-based data hub able to handle a variety of big data streams and to become a valuable tool for decarbonization. The hub assesses and assigns fuel consumption and emissions to vehicle activities, providing thus accurate insights from global statistics overview to pallet-level detailed tracking and control, as well as for improving and optimizing fleet operations and maintenance. Our approach combines domain-specific experience and tools with widely accepting standards from the transportation sector and the Global Logistics Emissions Council (GLEC) framework as well as with state-of-the-art technologies of telematics platforms, used to enrich the quality and level of confidence of the acquired data, such as digital twins modeling, machine learning, NoSQL databases, elastic cloud services, business intelligence platforms, and more.

[8839] *Technical economic analysis of an autonomous photovoltaic system operating in Chocó, Colombia*

William Murillo (Universidad Tecnológica del Chocó), Hector David Agudelo (Universidad Tecnológica del Chocó), Maycol F. Mena (Universidad Tecnológica del Chocó), Edison Banguero (Universidad Tecnológica del Chocó), Andrés Julián Aristizabal (Universidad de Bogotá Jorge Tadeo Lozano), Reiner Palomino (Universidad Tecnológica del Chocó) and Samir Córdoba (Universidad Tecnológica del Chocó).

This article presents a discussion of the results of monitoring an electrochemical storage system for lead acid (Pb-A) in the sixth year of operation made up of 48 batteries. The batteries are divided into two parallel circuits (series battery banks Sb1 and Sb2), each consisting of 24 batteries, which form part of a 20 kWp independent, modular photovoltaic (PV) power plant. Technical parameters such as state of charge (SOC), Pb-A system voltage and temperature, as well as charge/discharge currents were monitored, along with power flow before and after the Pb-A system inverter. The incremental charge/discharge efficiency between two SOCs, the duration of the charge (charge time, Tc) and discharge (discharge time, Td) cycles, and the Coulombic efficiency were evaluated from the measured data. In addition, a statistical analysis of the SOC was performed to specify the energy delivered from the series of battery banks Sb1 and Sb2. This allowed the evaluation and a detailed understanding of the operational performance of the photovoltaic system (PVS), from a technical and economic point of view. It was found that the average minimum and maximum SOC of b1 were 78.9% and 99.96%, respectively, and the average minimum and maximum SOC in b2 were 78.15% and 99.83%, respectively, for the monitored period. The efficiency of the incremental cycle (Ycd) varies for b1 from 92% to 99% and, for b2, between 80% and 99%. From the monitoring of these parameters, and by using actual costs, the Levelized Cost of Electricity (LCOE) was determined for various discount rates.

[8874] *Design and Establishment of an Implementation Program to Simulate the Far Field Propagation for A Gaussian Beam of X-Ray Laser*

Mohammed Saleh (College of Education for pure Science-Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq) and Thair Alaish (College of Education for Pure Sciences Ibn Al-Haitham).

The propagation of the Gaussian laser beam through the atmosphere is one of the most important features for military, scientific, industry and medical applications. this paper presents a theoretical study to simulate the effect of turbulence attenuation on propagation of laser beam and calculation of lossy power and divergence beam. A simulation of laser production within the X-ray region showed that the wavelength (0.0985 nm) used in the research could be obtained using the energy of the electron beam of (320 PJ). There are three important parameters in calculating the wavelength in the free electron laser (undulator period, relativistic factor, undulator parameter), and they appear through simulations when the laser power depends greatly on the undulator length and we can dispense with the resonator and increasing the undulator length. The divergence beam was increased with altitude and equals (0.0195003m) in (H= 11km). From the attenuation calculations, the power absorbed (lost) is directly proportional to the radius of the laser beam and inversely proportional to the laser wavelength. From the attenuation calculations, the power absorbed (lost) is directly proportional to the radius of the final laser beam and inversely proportional to the laser wavelength. As for the atmosphere turbulence, it is intense at sea level and decreases with altitude, the structure refractive index C_n^2 in MSL equal 3.92× 〖10〗 ^(-13) m^(2/3) and indicates the severe of turbulence. Fried Parameter r_o is directly proportional with altitude and (r_o=0.7485 µm) in sea level and indicates to severe turbulence and decreases with altitude . Therefore, the attenuation operation and atmospheric turbulence are affected by temperature fluctuations and altitude.

[8905] *Calculating the Radioactivity Concentration of CR-39 Detectors Using the Area Frequency Density Function*

Adil Mansoor (Physics department, College of Education for pure sciences Ibn Al-Haitham, University of Baghdad, Baghdad, Iraq.) and Hameed Abduljabbar (University of Baghdad).

In this study, a new method for calculating the measurement of saturated radon gas concentration was presented using the area frequency density function, where images of CR-39 samples were analyzed by means of the Image-J program, that were exposed for a whole month to soil samples from different regions of Najaf province - Iraq. The difference in the area between the tracks was adopted due to the possibility of the presence of more than one close trace for alpha particles, which led to the appearance of tracks of a large area as a result of their merging due to the chemical etching process, therefore, the area of the track was taken into account when conducting the counting process by adding a weight factor to correct the counting process based on its area. Preprocessing steps of image samples were carried out by removing defects resulting from the chemical etching process of CR-39 detectors. The study showed an increase in the calculated radon gas concentration by (20%-60%) over its calculated counterpart using manual counting.

[9243] *Integration of photovoltaic systems into buildings for rural application*

Olga Shepovalova (Federal Scientific Agroengineering Center VIM (FSAC VIM)).

In this article, the possibility of PV modules and PV systems integration into the building structures of various objects, in rural areas, has been studied. The practicability of such integration has been investigated and possible modification of the requirements for PV modules has been considered. The basic groups of objects into which PV modules can be integrated, their design options and the specifics of such integration have been analyzed. Structurally adequate options for PV modules/components of the PV system have been considered. The analysis was made for territories with various climates and for various agricultural production types and levels.

[9497] *Monitoring and Detection of Dust Storms Using Satellite Modis Data over Iraq*

Aws Al-Khudhairy (Al Mustansiriyah University), Yaseen Al-Timimi (Department of Atmospheric Science, College of Science, Mustansiriyah University, Baghdad, IRAQ.) and Auday Shaban (Department of Remote Sensing & GIS, College of Science, University of Baghdad, Baghdad, IRAQ.).

Dust storms can suspend large quantities of sand and cause haze in the boundary layer over local and regional scales. Iraq is one of the countries that is often impacted to a large degree by the occurrences of dust storms. Sand and dust storms (SDSs), which present environmental risks and affect the regional climate, have been worsened in the East Asian regions over the last decade. Monitoring SDS from space using satellite remote sensing (RS) has become one of the most important issues in this field. We investigate the sand and dust storms detection in Iraq using Moderate Resolution Imaging Spectroradiometer (MODIS) data, both from Terra and Aqua satellite systems for the year 2022. MODIS Surface

Reflectance Daily L2G Global 1 km and 500 m data were utilized to calculate the Normalized Difference Dust Index (NDDI). The MYD09GA V006 product was used to monitor, map, and assess the development and spread of dust storms over the arid and semi-arid territories of Iraq. And BT thermal emissive band (MODIS band 31) can discriminate aerial and surface sand and dust over Iraq. Normalized Difference Dust Index (NDDI) is applied for the detection of sand and dust storms. We set thresholds for NDDI to distinguish between water and/or ice cloud and ground features and dust storms and BT to distinguish airborne dust from ground sand or dust. In addition, the data from Modis satellite, and meteorological stations from IMOS are used to validate NDDI-based sand and dust storm events.

[9837] *Spatial-temporal of Iraqi Coastline Changes Utilizing Remote Sensing*

Adel Al-Fartusi (Physics Department, Marine Science Center, Basrah University, Basrah, Iraq), Mutasim Malik (Physics Department, Science College, Wasit University, Wasit, Iraq) and Hameed Abduljabbar (University of Baghdad).

Assessment of human-ecosystem interactions in coastal environments is carried out by monitoring the change in the coastal line. In this study, we give an analysis of shoreline alterations along the Iraqi coast over the last five decades, during the period from (1973 to 2021), data series of Landsat (MSS, TM, ETM+, and OLI) were used and incorporated into GIS (Geographical Information System) for executing a temporal-spatial analysis for alterations in the coastline by applying (DSAS 5.1) Digital Shoreline Analysis System approach. Linear regression rate and endpoint rate quantified the high accretion at rates of more than 50 m /year also the net shoreline movement analysis identified about 2500 m toward the sea. The findings of this paper demonstrate an understanding of shoreline evolution and the ability to forecast future variations to support decision-makers in developing long-term management to safeguard our marine environment.

[9959] *Power oscillation damping controller for VSC of renewable generation units*

Ruslan Ufa (National Research Tomsk Polytechnic University), Vladimir Rudnik (National Research Tomsk Polytechnic University), Fujin Deng (Southeast University) and Yana Malkova (National Research Tomsk Polytechnic University).

Nowadays generation units based on the renewable energy sources is one of the central part in the programs for the development of electric power systems. It is known that modern renewable generation units have power electronic–based interface (in particular, via voltage source converter to convert the power). In one hand, use of a voltage source converter gives some benefits: no direct connection to the network, operation on all quadrants of PQ-diagram, renewable generation units can be connected to very weak systems. However, in other hand, widely used application of renewable generation units based on the voltage source converter decreases the overall inertia of the electric power system, overusing of power electronic converters in the electricity grid will cause lots of harmonic pollutions and brings new problems to safe and stable operation of electric power system. To ensure the reliable operation of electric power system with renewable energy sources units based on the voltage source converter, it is necessary to modernize the control system of the voltage source converter to the requirements for traditional generation as part of the electric power system. In this paper, the result of application of power oscillation damping controller realized in the voltage source converter to increase the stability of the electric power system is presented. The proposed solution is based on the “deloading” strategy of photovoltaic power station. The analysis of the impact of synthetic inertia block with double-circuit control on the damping of power oscillations is presented in this paper. The results of application of the power oscillation damping controller in following research scenarios (small disturbances and severe fault condition) and the impact of coefficients of the synthetic inertia block k are presented. To evaluate this impact, the transient damping ratio was calculated, and eigenvalues analysis was done.