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ABSTRACT BOOK

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(ESWAE-2024)

Main Theme: The United Nations 17 Sustainable Development Goals

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November 21 - 23, 2024

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Abstract Book

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Keynotes

Prof. Dr. Sibel Balcı

TED University, Turkey

Keynote Title: "Integrating Sustainable Development Goals into University Life: Challenges and Opportunities"

Biography: Prof. Dr. Sibel Balcı works as a faculty member in the Department of Primary Education at TED University Faculty of Education. Dr. Balcı is a distinguished academic in the field of science education, with a particular focus on education for sustainable development. She completed the Department of Secondary Science and Mathematics Education, Middle East Technical University. Dr. Balcı then pursued her Ph.D. at the same institution, where she specialized in eco-schools. Her work has encompassed sustainable development goals, primarily in the context of SDG 4 Quality Education.

Dr. Balcı is also a dedicated educator, teaching courses in environmental education, science education integrated with sustainable development goals and related fields. She is known for her commitment to student success and her ability to inspire future teachers. Beyond her teaching and research, she actively engages in environmental projects and collaborates with partners to develop sustainable environmental solutions.

Currently serving as the Dean of Students, her work with university students involves topics such as sustainable campus practices, gender equality, responsible consumption and production. At present, she is collaborating with a researcher benefiting from the Marie Curie Postdoctoral Fellowship Program to systematically design a core curriculum and extracurricular activities for integrating sustainable development goals into University life.

Prof. Dr. Balcı's work continues to make significant impacts in the field of education for sustainable development, reflecting her dedication and expertise.

Dr. Sonila Daiu

University Metropolitan Tirana, Albania

Keynote Title: "Future-Ready Education: The Role of English Language and Technology in Meeting SDGs"

Biography: Sonila Daiu is the Dean of Students and a lecturer at University Metropolitan Tirana, where she lectures and conducts the management and coordination of academic and social activities, alumni relations, and student admissions in a higher education institution. This includes providing academic and social support, assisting alumni, defining admission policies, developing the campus environment, collaborating with student clubs, managing administrative tasks,and monitoring student performance.

Graduated in English Language in 2002 from the Department of English Language, Faculty of Foreign Languages, Aleksandër Xhuvani University, Elbasan and Postgraduate specialization in Methodology – Linguistics at the University of Tirana, Faculty of Foreign Languages, Department of English Language, in 2009. In 2013, she enrolled in a Ph.D. program in Linguistics at the Department of English Language, University of Tirana, and in September 2016, she earned a Ph.D. in Linguistics.

Her work has focused on expertise in public communication, linguistics, ESP (English for Specific Purposes) focused on the specific and professional needs of the learners. It includes areas such as English for Business, English for Engineering Purposes, English for Academic Purposes, and many other specialized field, self-confidence, and writing structure. In addition to her educational skills, she has several years of experience training students in ideation, structuring, and implementing their ideas in the startup world. She provides specialized assistance and guidance to help students develop successful ideas, organize their structure, and apply them in practice through personalized training. She has participated in and presented at various national and international conferences and has a considerable number of scholarly publications. She is also engaged in Erasmus+ projects.

Research Fields of Interest: Her main research interests include corpus linguistics and the application of corpus methods in the study of language and writing, native and foreign language correctness from a practical and innovative perspective in interaction with today’s technological developments.

Assoc. Prof. Dr. Serkan İlseven

Near East University, Department of Environmental Education, Lefkosa - North Cyprus

Keynote Title: The advantages of the Lefke CMC Area in Cyprus, which is being transformed into a Geopark within the scope of applied environmental education, and the problems that will arise during the implementation of this project

Biography: Artist Serkan İlseven was born on February 17, 1966 in Paphos, Cyprus. After completing his primary education in Paphos and secondary education in Lapta, he graduated from the Department of Geography of the Faculty of Social Sciences of Izmir Dokuz Eylül University in 1989. He worked as a teacher and administrator in various high schools affiliated with the TRNC Ministry of National Education between 1990-2009. He served as the Director of Administrative, Financial, Technical and Parliamentary Services in the TRNC Assembly of the Republic between 2009-2019, as the general manager of the Presidency between 2020-2023, and as the undersecretary of the Ministry of Labor and Social Security between 2023-2024. He is currently the chairman of the TRNC Presidency Culture and Arts Committee. He is a member of the Presidential Bi-communal Environmental Committee. He is the Vice President of the TRNC Environmental Protection Foundation. He completed his MA in Physical Geography in 2009 and his PhD in Environmental Education and Management at the Near East University Institute of Educational Sciences in 2014. He became an Associate Professor in 2019. İlseven teaches at the Geography Department and the Environmental Education and Management Department of the Faculty of Arts and Sciences at Near East University. He has published books titled Geography of Cyprus, Forest and Park Trees of Northern Cyprus, Human, Economic and Political Geography of Cyprus, Physical Geography of Cyprus, Orchids of Cyprus, Principles of Vegetation Geography, Forest and Park Trees of Cyprus. Dozens of his articles have been published in international journals. He started painting in the early 1980s by taking painting lessons from the painter Alper Özkemal. He has held 8 solo exhibitions and hundreds of group exhibitions in Turkey and abroad. Serkan İlseven, whose works are in private collections at home, abroad and in Turkey, was awarded the XIIIth State Painting and Sculpture Exhibition Award in 1998, the PGM Award in 2000 and the Fergani Award given by the Near East University to master painters in 2020. He participated in the TURKSOY Painters Meeting (Mersin) in 2002 and the International Art Days (Izmir) in 2004 as the TRNC representative. He is the father of two daughters named Polen and Dolin.

Future-Ready Education: The Role of English Language and Technology in Meeting SDGs

Sonila Daiu, Xhoana Pole, University Metropolitan Tirana, Tirana, Albania

Abstract

As the world becomes increasingly interconnected, the role of English as a global lingua franca is more critical than ever. This keynote speech will explore the transformative potential of English language technology in advancing global education and contributing to the achievement of the United Nations 17 Sustainable Development Goals (SDGs).
In an era where digital literacy and technological proficiency are paramount, integrating English language education with advanced technologies presents a unique opportunity to drive sustainable development. This study will highlight case studies and best practices from diverse regions, showcasing successful implementations of English language technology that have led to improved educational outcomes.

These examples will underscore the importance of sustainable and inclusive approaches in leveraging technology to achieve educational equity. By leveraging digital tools, such as AI-driven language platforms, educational institutions can provide more personalized and accessible learning experiences, thus contributing to broader societal goals.

The speech will then draw connections between enhanced English language skills and specific SDGs, such as Quality Education (Goal 4), Reduced Inequalities (Goal 10), and Partnerships for the Goals (Goal 17). By highlighting these links, we will demonstrate how proficiency in English can empower individuals, bridge educational gaps, and facilitate global cooperation toward sustainable development.

Critical discussions will also focus on the challenges and ethical considerations of deploying technology in education, including issues of digital divide, data privacy, and the need for context-specific adaptations. Solutions and strategies for mitigating these challenges will be proposed, aiming to maximize the benefits while minimizing potential drawbacks. Ultimately, this keynote will underscore the indispensable role of education and technology in realizing the SDGs, advocating for innovative and inclusive approaches that harness the power of English language technology to create a sustainable and equitable future for all.

Keywords:

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Spatio-temporal occupation of forest ecosystems: Case of Beni Smiel, Tlemcen

Sabiha Bouchaour-Djabeur, Mohamed Abdelmonaim Beneddra, Tlemcen University
Kheloufi Benabdeli, Mascara University, Algeria

Abstract

A study was conducted in Beni Smiel, a mountainous region in western Algeria to clarify the nature and importance of causes and actions contributing to forest degradation and to examine the effects of land use on forest ecosystems.

After several surveys and using the remote sensing tool, six zones were installed with three plots of 100 m2 each. Zone five contained a single plot and zone six included agricultural land taken as an entity. Spatial observation was carried out using satellite imagery as the basis for automatic interpretation. Descriptive and numerical maps and data were produced.

The analysis of degradation factors shows the extent of the impact of poor spatial management on the protection of forest ecosystems, which remains a major factor in the decline of vegetation cover. The potential of each area is not fully exploited. Most of the forests are bare lands and forest use areas on steep slopes have been reclaimed for agricultural purposes. The grazing area is not fixed and cattle are forced to graze in the forest area.

One of the priority measures to address poor spatial management is conservation, which can only be achieved by improving pastures, which is the most difficult measure. The main development orientations are divided into three zones: East, Central and West, including afforestation projects, valley restoration, infrastructure and sustainable development of agricultural land.

Satellite imagery enables continuous, large-scale monitoring of forest ecosystems. It provides near-precise data on forest cover, tree health, changes in land use and the impacts of human activities and natural phenomena. This information is crucial for making informed forest management decisions, helping to preserve biodiversity and combat climate change through data integration, capacity building, international collaboration and regulatory change.

Keywords: forests, surfaces use, impact, degradation causes, conservation, satellite imagery.

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Spatio-temporal occupation of forest ecosystems: Case of Beni Smiel, Tlemcen

Sabiha Bouchaour-Djabeur, Mohamed Abdelmonaim Beneddra, Tlemcen University
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Keywords: forests, surfaces use, impact, degradation causes, conservation, satellite imagery.

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Examining the Macroeconomic Effects of Green Finance on the Sustainable Development Goals in G20 Countries

Süleyman Bolat, Aksaray University, Turkey
Cosimo Magazzino, Roma Tre University, Italy
Behnaz Saboori, Sultan Qaboos University, Omanda

Abstract

Economic and human activities have largely impacted the entire ecosystem, affecting resource waste and land use and causing increased pollution. The decarbonization of the energy sector is essential for economies to realize their climate-policy objectives. This requires significant investments in the infrastructure of low-carbon energy sources; however, resources that are now available are not adequate to satisfy this need. This research aims to analyze the impact of green finance on macroeconomic fundamentals over the period 2000–2020 for G20 countries using several panel data and Machine Learning (ML) techniques. The findings can provide policymakers with a variety of suggestions for enhancing green finance, expanding digital finance, and creating a carbon trading market in order to enhance long-term sustainability.

Keywords:

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Design, analysis and implementation of a high-gain quasi-switched boost inverter for renewable energy applications

Majid Hosseinpour, Pooria Azimi, University of Mohaghegh Ardabili, Iran

Abstract

The salient advantages of inverters based on Z-source networks have made them proper for renewable energy conversion applications that are required to increase input DC voltage and convert it to AC energy. Switched Boost Inverters (SBI) are single-stage DC-AC power converters utilizing an active switch in the impedance network whose output voltage can be greater or less than its input DC voltage. This paper introduces a modified quasi-Z-source inverter (qZSI) structure with an active or quasi-switched boost inverter (qSBI). The suggested inverter provides a high boost factor with a small shoot-through interval and a high modulation index. The distinguished features of the suggested inverter are continuous input current and low voltage stress of switches. Moreover, despite the significant impedance source inverters, the suggested inverter is deprived of initial inrush current. Hence, the input voltage ripple is slight. Operation principles and requisite analyses have been represented, and comparisons based on various parameters with similar inverters have been carried out to showcase the superiority of the suggested inverter. The experimental results validate the accuracy and performance of the suggested inverter.

Keywords:

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Design and Optimization of Polymer-Based Organic Solar Cells with Enhanced Photocurrent Using Plasmonic Metal-Metal Core-Shell Nanoparticles

Hamid Heidarzadeh, University of Mohaghegh Ardabili, Iran

Abstract

This work investigates the effect of shell thickness on the photocurrent density in polymer-based solar cells using gold-silver and silver-gold metal-metal core-shell nanoparticles. Simulation results indicate that as the shell thickness increases, the photocurrent density generally rises, and after reaching an optimal point, it stabilizes or slightly decreases. This performance improvement is attributed to enhanced plasmonic effects in the metal-metal combination, which leads to better light trapping and absorption. For instance, for a cell thickness of 80 nm, photocurrent densities of 13.74 mA/cm², 16.62 mA/cm², and 19.3 mA/cm² were obtained for the cell without nanoparticles, with Ag nanoparticles, and with Au-Ag nanoparticles, respectively. These findings highlight the importance of optimizing shell thickness and material composition in core-shell nanoparticles to maximize the efficiency of solar cells.

Keywords:

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Cost minimization of electric energy from multiple providers using ant colony optimization applied to job shop scheduling

Lahcene Boukelkoul, University of 20th August 1955 Skikda, Algeria

Abstract

Grid tied renewable energy stations are more and more used. In countries where the electric energy is far away to satisfy the energy demand, small energy suppliers are starting up to generate more power in such a way to satisfy the demand.Electricity market could know some disturbances due to some problems. These problems could be transient or permanent. In case of lack of electric energy from the main provider, small providers will essay to fill in the gap. In such cases where the providers are limited energy feeders, they put constraints and conditions to supplypower. As examples, limited power, price and time, for each client. If there are more clients, the providers schedule the loads to be fed separately. The loads may vary from client to another, some loads could be equal to energy of a provider.To overpass these constraints, a flexible job shop scheduling distribution system is considered to optimize the supply of different clients depending on their demands. Inorder to adapt to energy demands, suppliers need to quickly adjust switching loads and production plans to meet demand . Therefore, the production mode of make-to-order (MTO) with multi-variety and small-batch demand is increasingly popular, and flexible job shop scheduling has become the focus of current research, especially for intelligent manufacturing systems with MTO requirements. Schedule power distribution is a timetable for both clients and providers. Resolving scheduling methods require substantial and extensive complex mathematical knowledge. Since job shop scheduling problems fall into the class of NP-hard problems, they are difficult to formulate and solve.In this paper, an approach to the resolution of the flexible job shop scheduling power distribution system is described. This approach combines the Ant system optimizationmeta-heuristic (AS) with local search methods, including tabu search. The results for the scheduling problems show that the ant systems with local search meta-heuristiccan find optimal solutions for different problems that can be adapted to deal with the flexible job shop scheduling problem. To illustrate the effectiveness and performance of the algorithm proposed in this paper, flexible job shop scheduling problem instances based on probabilistic data (price of kWh) have been selected to compute. The results show that the solutions obtained are generally acceptable and satisfactory.

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Soiling distribution in a Fresnel solar plant under real operating conditions: an analysis of reflectivity values in different zones

David Larra, Universidad de Extremadura, Spain

Abstract

Energy production in concentrating solar plants is influenced by different types of losses that reduce the efficiency of the system. One of the most relevant parameters is the reflectivity of the mirrors, which indicates the fraction of incident solar radiation that the mirrors can reflect. This variable is highly dependent on the soiling of the mirror surface, which reduces the ability to reflect incident radiation, thus decreasing energy generation. Different authors have studied reflectivity, soiling, and dust accumulation in concentrating technologies through the analysis and modelling of these factors and their main effects. However, there is still a lack of information available on specific technologies such as linear Fresnel collectors, even though soiling causes higher losses compared to technologies like photovoltaics. Many of the studies used samples of mirrors exposed to soiling rather than actual measurements on operating Fresnel plants. In addition, there is no data to show whether the soiling is distributed uniformly across the solar field, or if the location of the mirror rows and the surrounding environment influence the reflectivity variation. In this work, the distribution of reflectivity values in different zones of a Fresnel installation was analyzed under real operating conditions. The solar plant had four modules and was exposed to vehicle traffic in an industry located in an agro-forestry environment. Twelve points distributed over the entire solar field were selected, and more than seventy weekly or bi-weekly reflectivity measurements were carried out in six stages separated by manual mirror cleanings. A portable reflectometer was used to collect reflectivity data. Measurements were grouped by module and by zone, mean values and standard deviations were calculated, and a statistical analysis was performed using control charts. It was observed that soiling was slightly higher in the modules and mirror rows that were more exposed to the surrounding natural environment and the vehicle traffic area. However, the differences between the values of the different zones were not very significant. The largest deviations were observed for mirrors with operational failures resulting in different exposure times of the reflecting surface, demonstrating the importance of this factor.

Keywords:

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Valorization of bottom ash from incinerated hospital waste as an adsorbent of reactive dye

Ouadjenia Fatima, University of Mostaganem, Algeria

Abstract

Hospital waste incinerator (HWI) bottom ash was converted into a low-cost adsorbent, characterized and used for the removal of Remazol Brilliant Blue Reactive (RBBR) from an aqueous solution. The adsorbent was obtained from incinerated hospital waste (Mascara, Algeria). The dye RBBR was adsorbed onto raw (RB) and treated bottom ash (TB). The material was characterized by X-Fluorescence, Scanning electron microscopy (SEM), Specific surface area (BET method) and pH(PZC). The results indicated that this material consisted of silica, carbonates and sodium chloride. Batch adsorption experiments were conducted to determine the effect of pH, contact time and initial concentration. The adsorption capacity was found equal to 269.36 mg/g and 275.4 mg/g for RB and TB, respectively.The adsorption data was fitted with the linear forms of the Langmuir, Freundlich and Dubinin–Radushkevich (D-R) models. The results indicated that the Langmuir adsorption isotherm provided a very satisfactory description of RBBR adsorption on both types of bottom ash. This adsorption process is physical in nature according to D-R equation. The adsorption reaction follows the pseudo-second-order kinetic. The thermodynamic constants obtained revealed that the process was spontaneous and endothermic for both materials.

Keywords:

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Kinetic and thermodynamic study of Rhodamine B removal by natural bio-adsorbent from aqueous solution

Reda Marouf, University of Mostaganem, Algeria

Abstract

The hydric sources in Algeria were missing significantly, so the government policy goes toward preservation of the surface water from pollutants originated of industrial rejects. Among of these contaminants we find the dyes which can pollute water surface even at low concentrations. The present work is focused on the treatment of water contaminated by Rhodamine B dye, which is used in microbiology as histological fluorescent dye. To achieve this purpose, a bioadsorbent named Lichen which is a kind of fungi that it deposits on the trees, was used to remove rhodamine B (RB) from aqueous solution. This bioadsorbent was brought from national Park of Theniet El Had (in the region of Tessimssilit, Algeria). The characterisation results showed that this material had a specific surface area equal to 5.02 m2/g and the value of point of zero charge was around pH 7. The sorbent was tested for rhodamine B adsorption at different experimental conditions such as solution pH, contact time, initial concentration of RB and temperature. The maximum RB amount adsorbed was 15.80 mg/g registered for pH and temperature equal to 4 and 40 °C, respectively. The adsorption equilibrium was attended in 90 mins. The experimental data were fitted by Langmuir, Freundlich equations and the most adequate model was Freundlich. The kinetic adsorption of RB onto lichen sample follows the model of pseudo-second order. The thermodynamic study revealed that the process was physic in nature and endothermic where the disorder of RB molecules increased at the interface solution solid.

Keywords:

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Performance Of An Ejector Refrigeration System With New Alternative Friendly Refrigerants

Zoheir Derghout, Mechanical engineering department Applied sciences faculty Kasdi Merbah University, Ouargla, Algeria

Abstract

The purpose of this study is to examine the performance and the limits of the ejector refrigeration system using three new transitional refrigerants in hot climate in south of Algeria where the outside temperature reach, the variation of the coefficient of performance according to the heat sources is investigated, the parameters considered are the COP (Coefficient Of Performance), the ejector outlet pressure, and the maximum condensing temperature. The aim of this research is to consider the performance of an ejector cooling system under climatic conditions of hot climate in the south of Algeria where the temperature reaches fifty degrees in summer period. A study on the influence of the three source temperatures on the efficiency of the ejector cycle.
The system is evaluated for evaporator temperatures from 0°C to 20°C and condenser temperatures from 30 to 50 degrees Celsius. The system is optimized for each condition by selecting the optimal ejector parameters and generator temperature. R134a, R142b and R245fa are the three refrigerants used to optimise the ejector. In all work situations, the refrigerant R245fa gives the best values of performance, more specifically, if the system provides cold at 20°C and removes heat at 30°C, the very extreme COP is 0.24. The code is written in Fortran programming code. This study consists of a study on a cooling system with ejector, the study starts by setting up a program for sizing the ejector according to characteristics of the three heat sources (evaporator, condenser and boiler), these results are validated by the experiment result within the VERPUR project (between CanmetNERGIE and Hydro-Qubec), the development of a simulation mode code to know the limitations of this ejector refrigeration cycle and the thermophysical properties of each point in the ejector for a given geometry. The findings of this research will provide valuable insights into the feasibility and efficiency of using transitional refrigerants in ejector cooling systems in a specific location like Constantine. This knowledge can contribute to developing sustainable and energy-efficient cooling solutions for various applications in the region and beyond.

Keywords:

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Insight Review On Solar Still Application

Alaa Ahmed Hamdoon, Technical Engineering College / Kirkuk, Northern Technical University, Iraq
Afrah Turki Awad, Renewable Energy Research Center-Kirkuk, Northern Technical University, Iraq

Abstract

No life can be sustained without access to drinkable water. The drinkable water can be produced by various methods either by renewable Energy or non-renewable energy. Renewable energy, especially solar energy, are freely available sources. Solar energy can be applied to produce water purifications using different techniques. One of the important techniques is the use of solar still. Solar still can be defined as the device that produces purified water from a salted one. It consists of a basin filled with salted water (impurified) and glass cover. Due to its importance, there are many studies conducted about this topic. In this study we provide a literature review which presents the different techniques implied to produce a drinkable water depending on solar energy. There are different methods that have been studied such as: nanoparticles, phase change material and so on. According to the literature, nanoparticles can still improve the surface of the solar still. The glass surface is coated with nanoparticles in order to improve the efficiency of the solar still. In fact, adding nanoparticles are beneficial due to their high surface area and higher thermal conductivity of these nanoparticles which in turn improve the heat transfer. However, these improvements are related to the type, size, shape and concentrations of nanoparticles. On the other hand, one of the limitations of solar still is their dependence on the availability of solar, to solve this limitation phase change material incorporated. The main purpose of the phase change material is their use to store energy and produce drinkable water during cloudy weather and during night. It is important to have access to drinkable water at different times especially at night when there is no sunlight. Other techniques have been studied by different researchers such as different designs of solar still. All of the above methods are well presented and critically reviewed in this paper.

Keywords:

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Effects Of The Tall Buildings On The Pollutant'S Dispersion Into The Atmosphere

Mohamed Aksouh, Malak Sengouga, University of Sciences and Technology Houari Boumediene, Algeria
Lwiza Dib, University of Sciences and Technology Houari Boumediene, Algeria

Abstract

Air pollution has become a constant preoccupation for governments, scientists and civil society in recent years. Growing awareness of the impact of pollutants on health and the environment has led to considerable efforts to reduce air pollution.Because of the diversity of pollutants likely to be present in the atmosphere, air pollution is an extremely complex phenomenon. Pollution levels on the ground depend on the nature and conditions of pollutant discharge, as well as on atmospheric conditions that influence the transport of pollutants.These phenomena mainly occur in the troposphere, the lowest layer of the atmosphere.In the long term, these emissions also compromise the resources needed for the sustainable development of our planet.The aim of this paper is to characterize the effects of the tall buildings on the dispersion of pollutants into the atmosphere.The first part of this work provides numerical prediction of the turbulent air flow structure around the tall building. The second part performs the behaviour of particles transport and sedimentation around the tall building, and their dispersions intro the atmosphere.Numerical prediction is based on the k-ω SST turbulence model to predict atmospheric flow around the tall building, and the Euler-Lagrange approach is used to track pollutants. The diameters of the particles considered in this work are of 1, 5, 10, 20, 50 and 100 µm,This work contributes to understanding the effects of tall buildings on the dispersion of the pollutants into the atmosphere, and this evidence can be used to develop strategies to improve air quality in densely populated urban areas.

Keywords: Turbulence, Euler-Lagrange, particles transport, pollutants

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Effect Of Environmental And Anthropogenic Factors On Soil Quality By Artificial Neural Networks

Fenni Mohamed, Faculty of Natural Science and Life, UFAS Setif1 University, Algeria

Abstract

Soil quality is an important factor affecting the productivity and sustainability of agricultural systems. However, soil quality is influenced by various environmental and anthropogenic factors, such as climate change, land use, management practices and pollution. The interconnections of these factors and their impact on soil structure, fertility and resilience have received considerable attention. However, despite significant advances in this field, many aspects remain to be elucidated. Therefore, it is necessary to monitor and assess soil quality and its changes over time and space. The factors involved in this process are difficult to analyze due to the complexity and non-linearity of the relationships between soil variables. Artificial neural networks (ANN) are a type of machine learning method that can model these relationships with high accuracy and flexibility. This study proposes an intelligent prediction system through the construction of a neural network and a learning base to predict the effect of each factor on soil quality. The application of artificial neural networks to analyze soil quality factors has proven to be an effective and innovative approach. The established correspondence equation offers a nuanced understanding of the relationships between input variables and soil quality outcomes. This study also discusses the advantages and limitations of these methods and suggests some future directions for research.

Keywords: Soil quality, Artificial Neural Networks, Prediction, Factors, Remote Sensing

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Modeling The Impact Of Climate Change On Renewable Energy Production: An Artificial Neural Network Approach

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Abstract

Objective: The research aims to analyze the effects of climate change on the production of renewable energy, focusing on sources such as solar, wind, and hydroelectric power.
Methodology: We will develop a comprehensive model utilizing artificial neural networks (ANNs) to examine the multifaceted factors that influence renewable energy production in the context of climate variability. This will involve integrating climate data, including temperature fluctuations, precipitation patterns, and extreme weather events
Results: The model will identify correlations and trends that affect energy output, providing a detailed understanding of how various climate factors impact renewable energy generation.
Conclusion: The findings will offer actionable insights for policymakers and stakeholders in the renewable energy sector, enhancing strategies for optimizing energy production and increasing resilience in energy systems amidst climate uncertainty.

Keywords: Climate changes, Renewable energy, Intelligent modeling, ANN

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Hot Red Pepper Drying With A Solar Greenhouse Dryer

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Abstract

Pepper is one of the most widely used ingredients in the world and is in increasing demand in the international food industry business. Red pepper is a type of pepper that forms an important ingredient in daily cuisine in Algeria. Peppers are rich in vitamins A and C as well as antioxidant components. In Algeria, pepper is traditionally dried. The traditional method is to tie the pepper stems with rope to form a wreath or cut the pods lengthwise into two strips, which are then dried in the open sun

Open sun drying, where the product is directly exposed to the sun allowing the material to absorb solar radiation, is one of the traditional techniques used in Algeria. The open sun drying method requires little investment, but it causes significant damage: it requires a large open area, very long drying times, and the final products are of poor quality due to insect and dust contamination.

Many solar drying systems are designed as alternatives to traditional drying in the open sun, especially in locations with good sunlight. These drying systems can be classified into three forms as direct, indirect and mixed mode.

This work attempts to evaluate the efficiency and profitability of a greenhouse (used in agriculture) for drying agricultural products. However, they are perishable crops, as they deteriorate within a few days after harvest. Its nutritional properties can be preserved by drying. In general, red chili peppers may undergo some specific treatments in order to slow down some non-enzymatic chemical reactions. Blanching chili peppers in hot water for 5 minutes reduces the initial moisture content and drying time. This work aims to study and analyze the drying of red hot pepper using solar greenhouses. A 300 kg greenhouse dryer was designed and built at the Solar Energy Equipment Development Unit (UDES) in Bou Ismail, Algeria. Red hot pepper drying experiments were conducted in June 2023. Various experimental data were recorded every hour such as ambient air temperature, humidity, greenhouse air temperature, etc. to evaluate the heat and mass transfer of the proposed system. This work presents the results of an experimental study on solar drying of red pepper. The drying process was carried out in an indirect dryer with forced convection. This type of dryer is inexpensive, easy to operate and is used for drying food products. The choice of red pepper is justified by its abundance and high consumption.

Keywords:

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The Impact Of Wall Orientation On Thermal Exchanges Within A Room: A Case Study Of Ouled Sidi Brahim In The Spring Season

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Abstract

The building is well-known for its excessive energy usage, associated with greenhouse gas emissions (pollution). The primary contributors to this excessive energy use are the heating and air conditioning systems used to maintain indoor thermal comfort. Due to the difference between the indoor and outdoor environments, a continuous heat exchange occurs between the building and its external environment. The current study aims to determine the thermal exchanges between a room and its surroundings through its walls during both daylight hours (when solar radiation is present) and nighttime (in the absence of sunlight). To achieve this objective, a brick room measuring 20 cm x 20 cm x 20 cm was constructed with four walls oriented towards the four main directions: east, west, north, and south. Temperature measurements were taken every minute at the midpoint of each wall's outer surface, as well as at the center of the room. These measurements were conducted using a specialized acquisition system during the spring months of April, May, and June in Ouled Sidi Brahim, which is located in northern Algeria. In the morning, the walls oriented towards the north and east exhibit higher temperatures than the room's inside, thereby contributing to its heating. In contrast, the walls facing west and south are cooler than the internal space, which results in a cooling effect as they permit heat to dissipate into the external environment through these two orientations. Conversely, in the afternoon, the sun is positioned in the south-western part of the sky. Consequently, the walls oriented towards the west and south facilitate an increase in room temperature, whereas those facing east and north assist in lowering it. At night, the heat accumulated in the room during the day escapes through its four walls to the surrounding environment, which tends to cool down in the absence of the sun. The indoor temperature is significantly affected by the temperature of the walls' outer surfaces. In other words, the orientation of the walls affects indoor thermal comfort. Models with a high correlation coefficient ($R^2 > 0.95$) were proposed for each month using stepwise linear regression, in which the indoor temperature was related to the outer surface temperatures of the walls. The contribution of the wall's orientation varies as the sun moves during the spring months. The orientation of walls significantly influences thermal exchanges, specifically regarding heat gains and losses. This research facilitates the optimal placement of rooms within a residence based on their intended use, thereby promoting energy cost savings.

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Ambient Temperature And Solar Radiation Effects On Absorber And Collector Mean Temperature In A Solar Chimney

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Abstract

Today, clean and renewable energy technologies are receiving more attention in scientific research. Among the most promising is solar energy. Numerous devices have been created to harness this energy and convert it into electrical power. Researchers have recently become interested in the solar chimney, which is less common than PV systems and has poor efficiency. Recently, the exploitation and use of solar chimneys have grown significantly due to their simplicity and wide application potential. The study of the effects of ambient temperature and solar radiation on absorber and collector mean temperature in a solar chimney was the objective of this experimental study. A solar chimney prototype with a collector diameter of 1 m equipped with 10 temperature sensors (5 on the absorber and 5 on the collector in the same plan) was constructed. The experiments were conducted in an arid climate. The variation of the ten temperature sensors within these locations, as well as the ambient temperature and solar radiation, has been carried out every minute. The findings show that ambient temperature and solar radiation have an impact on the mean temperatures of the absorber and collector. The evolution of the mean absorber and collector temperatures as a function of solar radiation and ambient temperature has been described by a mathematical model (polynomial). The models were validated using R^2 and RMSE statistical indicators. The model temperatures fit well the experimental results.

Higher collector and absorber temperatures result in increased air circulation speed within the solar chimney, as well as increased the chimney solar power and efficiency. Similarly, the absorber and collector temperatures in the solar chimney are influenced by the materials selection and the absorber and collector design.

Keywords:

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The Role Of Cyanothiophene Derivatives In Inhibiting Carbon Steel Corrosion In Acidic Medium : A Combined Experimental And Theoretical Study

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Abstract

The corrosion inhibition effect of two cyanothiophene derivatives on carbon steel in an acid medium was studied using weight loss measurements, quantum chemical calculations (DFT), and scanning electron microscopy (SEM).
The inhibition efficiency of both compounds was found to increase with higher concentrations, temperature, and exposure duration. The activation energy of the corrosion inhibition reaction in the presence of the inhibitors was higher than that of the blank solution. The experimental data followed the Langmuir adsorption isotherm, and the free energy values indicated that the inhibitors were spontaneously adsorbed on the steel surface through a mixed adsorption mechanism. SEM analysis confirmed the formation of a protective organic layer on the steel surface, while DFT calculations further supported the experimental findings, demonstrating that the inhibition effect is dependent on the molecular structure of the derivatives.

Keywords:

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Modeling And Simulation Of Organic Solar Cells Based On P3Ht:Pcbm Using Scaps 1-D (Influence Of Defects And Temperature On The Performance Of The Solar Cell)

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Abstract

In this work, we elucidate theoretically the effect of defects and temperature on the performance of the organic bulk heterojunction solar cell (BHJ) P3HT:PCBM. We have studied the influence of their parameters on cell characteristics. For this purpose, we used the effective medium model, and the solar cell simulator (SCAPS) to model the characteristics of the solar cell. We also explore the transport of charge carriers in the device. It was assumed that the mixture is lightly p-type doped and that the band gap contains acceptor defects near the HOMO level with a Gaussian distribution of energy states at 100 and 50 meV. We varied defects density between 1012-1017 cm-3, from 1016 cm-3, a total decrease of the photovoltaic characteristics due to the increase of the non-radiative recombination can be noticed. Then we studied the effect of variation of the electron and the hole capture cross-section on the cell's performance, we noticed that the cell obtains a better efficiency of about 3.6% for an electron capture cross section ≤ 10-15 cm2 and a hole capture cross section ≤ 10-19 cm2. On the other hand, we also varied the temperature between 120K and 400K. We observed that the temperature of the solar cell induces a noticeable effect on its voltage. While the effect of temperature on the solar cell current is negligible.

Keywords: Organic solar cell, P3HT:PCBM, defects, temperature, SCAPS, effective medium model

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Investigation Of Expired Drug Efficacy As A Corrosion Inhibitor For Copper In Sulfuric Acid

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Abstract

Corrosion leads to substantial economic losses, particularly in the industrial sector, underscoring the importance of effective preventive strategies. Using expired pharmaceuticals as corrosion inhibitors for copper in acidic environments presents several advantages, such as cost-effectiveness, lower toxicity compared to traditional inhibitors, and the added benefit of reducing pharmaceutical waste through recycling. This study examines the impact of inhibitor concentration, immersion time, and temperature on copper corrosion in a sulfuric acid environment, assessed through mass loss measurements. The findings indicate that inhibition efficiency increases with higher inhibitor concentrations but decreases with rising temperatures. In a 0.5 M sulfuric acid solution, expired pharmaceuticals demonstrated an inhibition efficiency of 97.67% at a 1% (V/V) concentration. The study also includes the calculation of activation energy, activation enthalpy, activation entropy, free energy of adsorption, adsorption enthalpy, and adsorption entropy. The adsorption of the inhibitor onto the copper surface followed the Langmuir adsorption isotherm. Additionally, Scanning Electron Microscopy (SEM) provided visual confirmation of the adsorption of expired pharmaceuticals on the copper surface.

Keywords:

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Calculation Of The Physico-Chemical Properties Of The Material Srbi2B2O7 By The Functional Density Theory

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Abstract

To achieve efficient frequency conversion, the nonlinear ultraviolet crystal must have a strong second harmonic generation and possible phase adaptation conditions, which brought us back to the calculations of the first principles that currently predict that SrBi2B2O7 potentially represents a new class of materials with such characteristics.For this purpose, we present in our work, a first analysis of the dynamic, binding of the single crystal of SrBi2B2O7 To highlight these properties, both density functional theory and topological analysis were used. The compound is found to have an indirect wide band gap and an interesting link pattern. According to the results, the dominant component of the second-order susceptibility is d33, whose value is 3.6 times higher than that of KDP, which makes SrBi2B2O7 very promising as a UV NLO material. In this way, the SrBi2B2O7 can be used to absorb light sources below 200 nm.

Keywords: Crystal SrBi2B2O7, band gap, second harmonic generation.

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Application Of The Optimal Derivative To The Study Of The Stability Of An Electronic Circuit Under The Effect Of Different Voltages

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Abstract

Linearization methods play a very important role in the study of nonlinear systems which are generally modeled by nonlinear ordinary differential equations. Although many systems can admit a domain of linear behavior, linearity is always an approximation of reality. The most classic approximation is that determined by the derivative in the Fréchet sense of the nonlinear equation. Due to the diversity and power of the tools developed in the linear domain, it is usual initially to linearize the nonlinear model around an operating point and to use the linear model thus obtained in order to extract as much information as possible.The object of this work is the analysis of a non-linear physical system from electronics as well as the use of certain tools specifically developed in this context.We applied the optimal derivative method to a physical system of an electronic motor circuit. This system is described by nonlinear ordinary differential equations. We are interested in the study of the asymptotic stability of this system. The approximation obtained by optimal derivation gives satisfactory results compared to the exact results while respecting the dynamics of the initial problem.

Keywords:

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Comparative Genomic Analyses Of Plant Growth-Promoting Traits In Actinophytocola Species

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Abstract

This study presents a comprehensive comparative genomic analysis of five species within the Actinophytocola genus—Actinophytocola algeriensis, Actinophytocola gossipy, Actinophytocola oryzea, Actinophytocola xanthii, and Actinophytocola xinjianensis. Our research aimed to map the distribution of plant growth-promoting traits (PGPT) and assess their potential to enhance agricultural productivity as biofertilizers. We specifically focused on genes involved in nitrogen fixation, phosphate solubilization, siderophore production, and phytohormone synthesis, which are pivotal for promoting plant health and growth.

Our analysis revealed a high diversity and frequency of PGPT genes in Actinophytocola algeriensis and Actinophytocola oryzea, positioning these species as prime candidates for biofertilizer development. These two species exhibited a robust set of genes facilitating root colonization, biofilm formation, and rhizosphere competence, essential for effective symbiotic plant-microbe interactions. Moreover, traits such as stress tolerance and pathogen resistance were prevalent, indicating a strong capability of these microbes to support plant health under biotic and abiotic stress conditions.

The study also highlighted the predominance of indirect plant growth promotion mechanisms over direct effects. This finding suggests that Actinophytocola species primarily contribute to plant growth by improving soil health and resilience against environmental stresses rather than directly stimulating plant growth.

Given these insights, the genomic data from Actinophytocola species suggest considerable potential for developing advanced biofertilizers aimed at sustainable agriculture practices. Future research should focus on experimental validation of the identified PGPT genes in field trials to establish their effectiveness in enhancing crop yield and resilience. Furthermore, understanding the interaction dynamics between these bacteria and plant roots could lead to tailored agricultural solutions that optimize plant growth under various environmental conditions.

Keywords: Actinophytocola, plant growth-promoting traits (PGPT), biofertilizers, genomic analysis.

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Evaluation Of The Cytotoxicity Of Wastewater From The Guelma Sewage Treatment Plant, Algeria, Using The Allium Cepa Test

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Abstract

Wastewater is a significant source of environmental contamination, introducing a wide array of chemicals, including endocrine disruptors, which pose substantial health risks to living organisms. To mitigate these dangers, sewage treatment plants (WWTPs) are employed to improve water quality before discharge into the environment. However, conventional wastewater treatment processes often fail to adequately remove all contaminants. This study evaluates the effectiveness of the Guelma WWTP by assessing the cytotoxicity of water samples collected from three stages of the treatment process: pretreatment (S1), decantation (S2), and disinfection (S3). The Allium cepa test was used as a bioindicator, where onion bulbs were exposed to the water samples for 24, 48, and 72 hours, followed by macroscopic analysis. The results indicated a significant reduction in root growth across all samples, with the most pronounced inhibition observed in S1, showing a 50% inhibition rate. This suggests a higher cytotoxicity in the untreated wastewater compared to the treated samples (S2 and S3). Despite some reduction in pollutant load through the treatment process, the residual cytotoxicity in S3 indicates that the current treatment methods at Guelma WWTP may not be fully effective. In conclusion, while the treatment process at Guelma WWTP reduces cytotoxicity, the persistence of harmful effects underscores the need for more efficient treatment alternatives to enhance pollutant removal and safeguard environmental health.

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Endocrine Disruptor Contamination In Algerian Wastewaters: Detection Of Bisphenol A In The Guelma City Wwtp

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Abstract

Recent studies have highlighted the widespread presence of chemicals in the environment, many of which are linked to serious health concerns. Among these, Bisphenol A (BPA) is one of the most prevalent synthetic xenoestrogens. Found in everyday products like plastics, personal care items, and pesticides, BPA is known for its ability to disrupt the endocrine system. Once these chemicals enter the environment, they often find their way into sewage systems and wastewater treatment plants (WWTPs), raising concerns about their impact on aquatic ecosystems and human health. To address this issue, effective wastewater treatment systems are crucial for removing endocrine disruptors before the water is discharged back into the environment.\nIn this context, the present study assesses the effectiveness of the wastewater clarification processes at the Guelma City treatment plant in Algeria. The assessment was conducted using High-Performance Liquid Chromatography (HPLC) in reverse-phase to analyze wastewater samples. The results are concerning: the biological treatment process, specifically the activated sludge basins, demonstrates only a 23% removal efficiency of BPA, leaving 77% of the contaminant in the treated water. Although the removal efficiency slightly increases to 31% by the end of the treatment chain, these figures remain insufficient to mitigate the risks associated with BPA contamination.\nThese findings underscore the urgent need for improvements in the wastewater treatment processes at the Guelma plant and other similar facilities. Enhancing the efficiency of existing treatments or introducing alternative technologies is necessary to better address the removal of BPA and other endocrine disruptors. Solutions could include modifying current processes, incorporating additional treatment steps, or exploring innovative wastewater treatment technologies to ensure the protection of both aquatic ecosystems and human health.

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