

5th INTERNATIONAL SCIENTIFIC-PRACTICAL SEMINAR

ENVIRONMENTAL ENGINEERING AND MODERN ECO-URBANISM



Georgian Technical University
Faculty of Civil Engineering

TBILISI / GEORGIA

online & in-person 18-22 / MAY / 2026



-ABSTRACTS BOOK-

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Adapted by Mariam Rasulan

Seminar ID

SEMINAR TITLE

INTERNATIONAL SCIENTIFIC-PRACTICAL SEMINAR-V
"Environmental Engineering and Modern Eco-Urbanism"

DATE & PLACE

18–22 MAY 2026 • TBILISI • GEORGIA
Georgian Technical University, Faculty of Civil Engineering

ORGANIZATION

Georgian Technical University, Georgia
Białystok University of Technology, Poland
University of Life Sciences in Lublin, Poland
National University of Architecture and Construction of Armenia, Armenia
IKSAD-Institute of Economic Development and Social Research, Türkiye

PARTICIPATION

Oral & Poster Presentation

EVALUATION PROCESS

All applications have undergone a double-blind peer review process

PARTICIPATING COUNTRIES

Georgia • Türkiye • Morocco • Azerbaijan • Uganda • Columbia • Ukraine • Iraq • Belorussia • Armenia • Pakistan •
Nigeria • Russia • Brazil • Algeria • Albania • India • Malaysia • Poland • Indonesia • Romania • Kirgizstan • Benin •
Hungary

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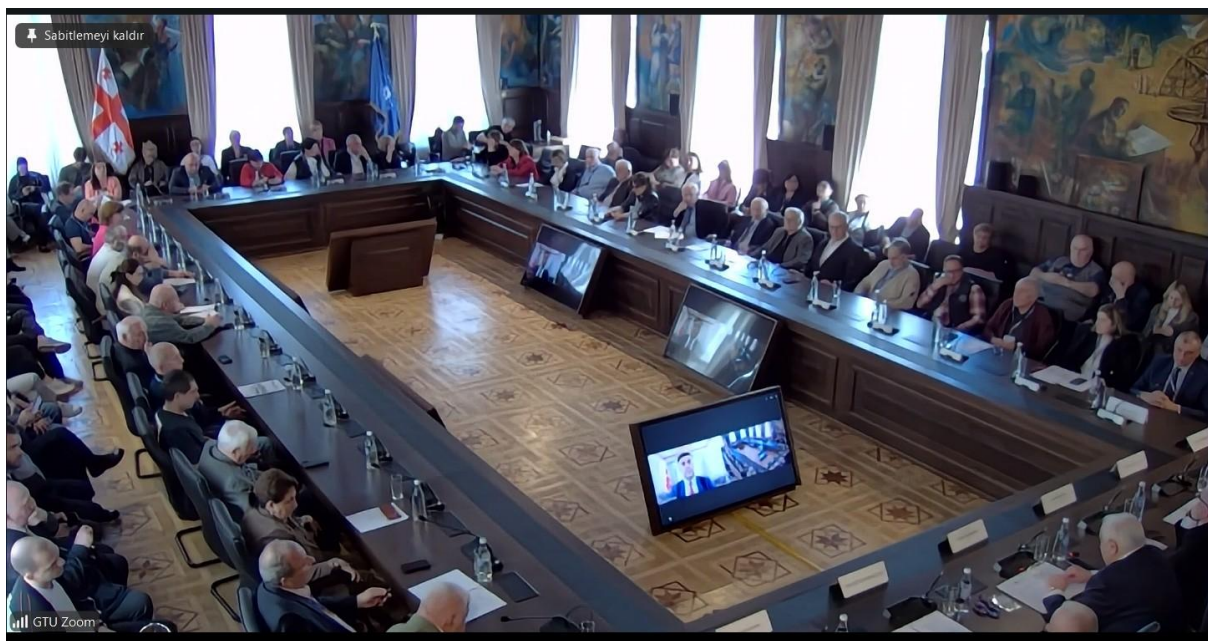
Daniel Slis — Professor, Rzeszow Polytechnic Institute, Committee Member;

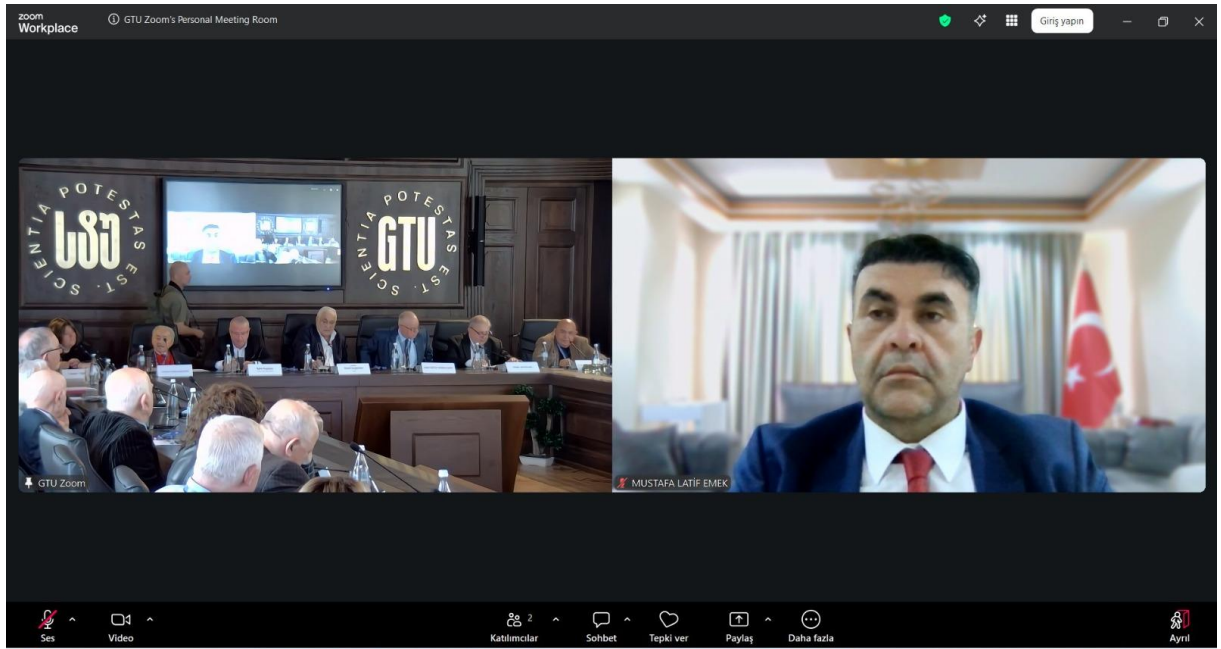
Gina Gureshidze — Deputy Dean, Faculty of Civil Engineering, Georgian Technical University, Professor, Committee Member;

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Prof. Dr. Samir Valiyev — Chairman of the Board of Management, Odlar Yurdu University (Azerbaijan)

Prof. Dr. Elshad Mammadov — Vice-Rector for Strategic Development and International Relations, Head of the Department of Economics and Economic Relations, Odlar Yurdu University (Azerbaijan)















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SEMINAR PROGRAM

მნიშვნელოვანია, გთხოვთ წაიკითხოთ ყურადღებით

- ონლაინ შეხვედრაზე დასასწრებად ეწვიეთ საიტს <https://zoom.us/join>, შეიყვანეთ შეხვედრის ID (Meeting ID) ან პერსონალური ბმულის სახელი (Personal Link Name) და დაადასტურეთ სესიაზე შესვლა.
- Zoom-ის აპლიკაცია უფასოა და არ საჭიროებს ანგარიშის (Account) შექმნას.
- Zoom-ის აპლიკაციის გამოყენება შესაძლებელია რეგისტრაციის გარეშე.
- აპლიკაცია მუშაობს პლანშეტებზე, ტელეფონებსა და პერსონალურ კომპიუტერებზე.
- მონაწილე უნდა ჩაერთოს სესიაზე პრეზენტაციის დაწყებამდე 5 წუთით ადრე.
- სემინარის ყველა მონაწილეს შეუძლია პირდაპირ ეთერში ჩაერთოს და მოუსმინოს ყველა სესიას.
- მოდერატორი პასუხისმგებელია სესიის პრეზენტაციასა და სამეცნიერო დისკუსიის (კითხვა-პასუხის) ნაწილზე.

გასათვალისწინებელი პუნქტები - ტექნიკური ინფორმაცია

- დარწმუნდით, რომ თქვენს კომპიუტერს აქვს მომართული და გამართული მიკროფონი.
- თქვენ უნდა შეგძლოთ Zoom-ში ეკრანის გაზიარების (Screen Sharing) ფუნქციის გამოყენება.
- დასწრების სერთიფიკატები გამოგეგზავნებათ PDF ფორმატში სემინარის დასრულების შემდეგ.
- სემინარის პროგრამაში ადგილისა და დროის შეცვლის შესახებ მოთხოვნები არ განიხილება.

Önemli, Dikkatle Okuyunuz Lütfen

- Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
- Online sunum yapabilmek için <https://zoom.us/join> sitesi üzerinden giriş yaparak “Meeting ID or Personal Link Name” yerine ID numarasını girerek oturuma katılabilirsiniz.
- Zoom uygulaması ücretsizdir ve hesap oluşturmaya gerek yoktur.
- Zoom uygulaması kaydolmadan kullanılabilir.
- Uygulama tablet, telefon ve PC’lerde çalışıyor.
- Her oturumdaki sunucular, sunum saatinden 5 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

Dikkat Edilmesi Gerekenler - TEKNİK BİLGİLER

- Bilgisayarınızda mikrofon olduğuna ve çalıştığına emin olun.
- Zoom'da ekran paylaşma özelliğini kullanabilmelisiniz.
- Kabul edilen bildiri sahiplerinin mail adreslerine Zoom uygulamasında oluşturduğumuz oturuma ait ID numarası gönderilecektir.
- Katılım belgeleri kongre sonunda tarafınıza pdf olarak gönderilecektir.
- Kongre programında yer ve saat değişikliği gibi talepler dikkate alınmayacaktır.

Important, Please Read Carefully

- To be able to attend a meeting online, login via <https://zoom.us/join> site, enter ID “Meeting ID or Personal Link Name” and solidify the session.
- The Zoom application is free and no need to create an account.
- The Zoom application can be used without registration.
- The application works on tablets, phones and PCs.
- The participant must be connected to the session 5 minutes before the presentation time.
- All seminar participants can connect live and listen to all sessions.
- Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

Points to Take into Consideration - TECHNICAL INFORMATION

- Make sure your computer has a microphone and is working.
- You should be able to use screen sharing feature in Zoom.
- Attendance certificates will be sent to you as pdf at the end of the seminar.
- Requests such as change of place and time will not be taken into consideration in the seminar program.

Zoom'a giriş yapmadan önce lütfen örnekteki gibi salon numaranızı, adınızı ve soyadınızı belirtiniz
Before you login to Zoom please indicate your hall number, name and surname

exp. H-1, Gamze TURAN

Online sessions Meeting ID and Passcode:

Zoom Meeting ID: 862 6236 6905 / Zoom Passcode: 012345

<https://us02web.zoom.us/j/86262366905?pwd=7Pqpaw9qXjpYzXXET0RqxedZfjdZzM.1>

Representatives from the following countries are participating in the seminar: Georgia, Turkey, Morocco, Azerbaijan, Uganda, Columbia, Ukraine, Iraq, Belorussia, Armenia, Pakistan, Nigeria, Russia, Brazil, Algeria, Albania, India, Malaysia, Poland, Indonesia, Romania, Kirgizstan, Benin, Hungary.

V საერთაშორისო სამეცნიერო-პრაქტიკული სემინარი

„გარემოსდაცვითი ინჟინერია და თანამედროვე ეკოურბანიზმი“

18 May 2026	
11:00	სემინარის მონაწილეთა რეგისტრაცია - საქართველოს ტექნიკური უნივერსიტეტი, ადმინისტრაციულ კორპუსი, მე-3 სართული
12:00	სემინარის გახსნა - https://zoom.us/j/5524008940?pwd=NmpZVGtISFBleWZ4bEpyY1B6YW1lQT09
12:00-13:00	დავით გურგენიძე - საქართველოს ტექნიკური უნივერსიტეტის რექტორი, აკადემიკოსი
	მუსტაფა ლატიფ ემეკი - ეკონომიკური განვითარებისა და სოციალური კვლევების ინსტიტუტის პრეზიდენტი (ონლაინ)
	ლევ ძიენისი - სტუ-ს სამეთვალყურეო საბჭოს წევრი (ონლაინ)
	კშიშტოვ კოვალჩუკი - ლუბლინის სიცოცხლის შემსწავლელ მეცნიერებათა უნივერსიტეტის რექტორი
	მანუკ გევორგ ბარსეგიანი - სომხეთის არქიტექტურისა და მშენებლობის ეროვნული უნივერსიტეტის (NUACA) რექტორი
	ჰოვანეს ტოკმანჯიანი - აკადემიკოსი, ეგაზაზაროვის წყლის პრობლემებისა და ჰიდრაულიკური ინჟინერიის ინსტიტუტის პროფესორი
	ელშად მამადოვი - ოდღარ იურდუს უნივერსიტეტის სტრატეგიული განვითარებისა და საერთაშორისო ურთიერთობების ვიცე-რექტორი
18:00	ბანკეტი
19 May 2026	
12:00 – 14:00	სემინარის სექციები (უცხოელებისთვის), სტუ-ს I კორპუსი, აუდიტორია #508/ბიბლიოთეკა
20 May 2026	
12:00 – 14:00	სემინარის სექციები (ადგილობრივი მოსახლეობისთვის), სტუ-ს I კორპუსი, აუდიტორია #508/ბიბლიოთეკა
11:00 – 13:00	ონლაინ სესიები
21 May 2026	
10:00 – 16:00	ექსკურსია
22 May 2026	
თავისუფალი დღე	

სემინარის გახსნა პირდაპირ ეთერში -

<https://zoom.us/j/5524008940?pwd=NmpZVGtISFBleWZ4bEpyY1B6YW1lQT09>

V International Scientific-Practical Seminar
"Environmental Engineering and Modern Eco-Urbanism"

18 May 2026	
11:00	Registration of seminar participants - Georgian Technical University, Administrative Building, 3rd Floor
12:00	Opening of the seminar - https://zoom.us/j/5524008940?pwd=NmpZVGtISFBleWZ4bEpyY1B6YW1lQT09
12:00-13:00	David Gurgenidze - Rector of the Georgian Technical University, Academician
	Mustafa Latif Emek - President Of Institute Of Economic Development And Social Research (Online)
	Lech Dzienis - Member of the Supervisory Board of GTU (Online)
	Krzysztof Kowalczyk - Rector of the University of Life Sciences in Lublin
	Manuk Gevorg Barseganyan - Rector of the National University of Architecture and Construction of Armenia (NUACA)
	Hovhannes Tokmanjian - Academician, Professor of the Egyazarov Institute of Water Problems and Hydraulic Engineering
	Elshad Mammadov - Vice-Rector for Strategic Development and International Relations of Odar Yurdu University
18:00	Banquet
19 May 2026	
12:00 – 14:00	Seminar sections (for foreigners), GTU Building I, Auditorium #508/Library
20 May 2026	
12:00 – 14:00	Seminar sections (for locals), GTU Building I, Auditorium #508/Library
11:00 – 13:00	Online sessions
21 May 2026	
10:00 – 16:00	Excursion
22 May 2026	
Free day	

Opening of the seminar in Live -

<https://zoom.us/j/5524008940?pwd=NmpZVGtISFBleWZ4bEpyY1B6YW1lQT09>

19.05.2026 / IN-PERSON SESSION-1

Tbilisi Local Time/ 12:00 – 14:00

Venue: Georgian Technical University, Building I, Auditorium #508/Library

HEAD OF SESSION: Prof. Dr. Mariami Managadze

Authors	Affiliation	Presentation Title
Yiğit, Süreyya	<i>New Vision University, Georgia</i>	GEOPOLITICAL SHIFTS IN EUROPEAN SECURITY: SPRING 2026
Mariami Managadze	<i>Tbilisi state medical university, Georgia</i>	THE PROBLEM OF MICROPLASTICS IN ENVIRONMENTAL MEDICINE
Muhammad Sufian Muhammad Javaid Afzal	<i>University of Education, Township, Lahore, Pakistan</i>	ENHANCED CATALYTIC CONVERTER SIMULATION FOR IMPROVED AIR POLLUTION CONTROL
Majdi Elmehdi Hamza Marouani Soufiane Zerraf Said Belaaouad	<i>Laboratory of Physical Chemistry of Applied Materials, Ben M'Sick Faculty of Sciences, Hassan II University of Casablanca, Casablanca, Morocco</i>	EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE PHYSICOCHEMICAL PROPERTIES OF A NOVEL STRONTIUM POLYPHOSPHATE, A-SR(PO ₃) ₂
Bulent Buyuk Gonul Kamislioglu Mirac Kamislioglu Ismail Kocak	<i>Bandirma Onyedi Eylul University, Turkey</i>	X-RAY RADIATION ATTENUATION PROPERTIES OF BORON DOPED MEDIUM DENSITY FIBREBOARD AND PARTICLEBOARD MATERIALS
Nazakat İbrahim Zamanova	<i>Azerbaijan State Pedagogical University, Azerebaijan</i>	GREEN SETTLEMENTS IN THE DIGITAL WORLD
Canan Can Bülent Büyük Dr. Mirac Kamislioglu	<i>Bandırma Onyedi Eylül University, Turkey</i>	PRODUCTION, CHARACTERIZATION, AND EVALUATION OF THE PERFORMANCE OF ULEXITE-DOPED POLYURETHANE FOAMS AS TARGET MATERIALS FOR PROTON-BORON FUSION EXPERIMENTS
Dinesh Kumar Singh	<i>Bennett University, India</i>	UNLOCKING THE POTENTIAL OF NANOTECHNOLOGY FOR ENVIRONMENTAL FORENSIC MAPPING: A SUSTAINABLE ENGINEERING PERSPECTIVE
Michał Jurek	<i>Rzeszow University of Technology, Poland</i>	THE PROBLEM OF REUSING DECOMMISSIONED WIND TURBINE BLADES - PERSPECTIVES FOR APPLICATIONS IN CIVIL ENGINEERING

Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

20.05.2026 / IN-PERSON SESSION-2

Tbilisi Local Time/ 12:00 – 14:00

Venue: Georgian Technical University, Building I, Auditorium #508/Library

HEAD OF SESSION: Prof. Dr. Nugzar Rurua

Authors	Affiliation	Presentation Title
Georgi Chaghiashvili Shota Mestvirishvili	<i>Georgian Technical University, Georgia</i>	GAS SEEPAGE INVESTIGATION ON THE BLACK SEA SHELF IN THE BATUMI AQUATORY.
Mariam Tsirekidze David Kiknavelidze	<i>Georgian Technical University, Georgia</i>	HOW ECOLOGICAL DESIGN AFFECTS PEOPLE'S BEHAVIOR IN PUBLIC SPACES
Tariel Kvitsiani Liana Kvartskhava	<i>Georgian Technical University, Georgia</i>	DIFFERENTIAL EQUATIONS OF SNOW AVALANCHE MOTION AND CRITERIA FOR STABILITY AND INSTABILITY
Natalia Chanturia Lizi Chubinidze Luka Chanturia	<i>Georgian Technical University, Georgia</i>	ENVIRONMENTAL ENGINEERING AND THE FORMATION OF GREEN ENTREPRENEURIAL THINKING IN YOUNG PEOPLE
Bella Goderdzishvili Mariam Tsiklauri Rusudan Bulbulashvili	<i>Georgian Technical University, Georgia</i>	RAISING ENVIRONMENTAL AWARENESS AMONG YOUNG PEOPLE THROUGH THE EXAMPLE OF OPTIMIZING WATER RESOURCES MANAGEMENT
Bella Goderdzishvili Natia Kuparadze	<i>Georgian Technical University, Georgia</i>	TUSHETIES NATURAL RESOURCE DEVELOPMENT
Manuchar Shishinashvili	<i>Georgian Technical University, Georgia</i>	ROAD INFRASTRUCTURE AND ECO-URBANISM: ENGINEERING APPROACHES TO SUSTAINABLE ROAD INFRASTRUCTURE
Irma Inashvili, Konstantine Bziava, Zaal Tsinadze, Demetre Janjalashvili	<i>Georgian Technical University, Georgia</i>	TWO- DIMENSIONAL NUMERICAL MODELING OF DEBRIS FLOW HAZARD ZONES IN THE COMPLEX TERRAIN OF THE SOUTH CAUCASUS: A CASE STUDY OF THE AMBROLAURI MUNICIPALITY (GEORGIA)
Giorgi chubinidze	<i>Georgian Technical University, Georgia</i>	SUSTAINABLE AND CLIMATE RESILIENT ROAD INFRASTRUCTURE IN GEORGIA: INTEGRATION OF ENGINEERING, ENVIRONMENT AND URBAN DEVELOPMENT
Nugzar Rurua Nadirashvili Petre Iremashvili Khvicha	<i>Georgian Technical University, Georgia</i>	A SYSTEMATIC APPROACH TO HIGHWAY TRAFFIC ANALYSIS AND OPERATIONS
Nugzar Rurua Tengiz Papuashvili Aleks Burduladze	<i>Georgian Technical University, Georgia</i>	The influence of the bond between asphalt concrete layers on the development of damage in the layer
Boris Maisuradze	<i>Georgian Technical University, Georgia</i>	Improvement of Drinking Water Supply for the City of Tbilisi
Manon Kodua Mariam Tebidze Ivane Saghinadze	<i>Georgian Technical University, Georgia</i>	INVESTIGATION OF THE STABILITY OF SUBMERGED GEOTUBES UNDER WAVE ACTION ON SANDY COASTS
Amiran Sakvarelidze	<i>Georgian Technical University, Georgia</i>	SHRINKAGE BEHAVIOR OF CEMENT-BASED COMPOSITES
Vitali Kavalenka	<i>Brest State Technical University, Republic of Belarus</i>	ELECTRONIC MODEL OF MUNICIPAL SOLID WASTE CIRCULATION
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HEAD OF SESSION: Prof. Alejandro Ruiz Sánchez

Authors	Affiliation	Presentation Title
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Alejandro Ruiz Sánchez Jorge Andrés Sierra Del Rio	<i>Instituto Tecnológico Metropolitano, Columbia</i>	GEOMETRIC OPTIMIZATION OF VORTEX CHAMBERS FOR LOW
Alejandro Ruiz Sánchez Jorge Andrés Sierra Del Rio	<i>Instituto Tecnológico Metropolitano, Columbia</i>	HYDRODYNAMIC MISMATCH: LIFT-BASED ROTORS IN CURVILINEAR FLOWS
Tuhina Sinha Priya Chaudhuri	<i>Amity University Jharkhand, Ukraine</i>	AIR QUALITY ENGINEERING SOLUTIONS AND LEGAL ENFORCEMENT: EVALUATING INDIA'S FRAMEWORK FOR URBAN AIR POLLUTION CONTROL
Bendahlane Hasna	<i>Mohamed 5 university, Morocco</i>	APPLICATION OF InSAR TECHNIQUES FOR MONITORING AND ANALYSIS OF LAND SUBSIDENCE
Nadhim M. Faleh Zahraa N. Mejbil	<i>Mustansiriyah University, Baghdad, Iraq</i>	ARCHITECTURAL SIGNIFICANCE AND SUSTAINABLE DESIGN OF HISTORICAL HOLY PLACES IN NAJAF AND TBILISI
Nino Nakvetauri	<i>Georgian Technical University, Georgia</i>	STRUCTURAL STABILITY OF MULTI-STOREY BUILDINGS WITH CONSIDERATION OF CREEP DEFORMATIONS IN PRESTRESSED STRUCTURAL SYSTEMS
Gina Gureshidze Giorgi Abuselidze Muhammet Zeki Ozyurt	<i>Georgian Technical University, Georgia</i>	SEISMIC PERFORMANCE IMPROVEMENT OF REINFORCED CONCRETE COLUMNS USING RECYCLED PLASTIC WASTE AND PET-FRP CONFINEMENT
Elina Kristesiashvili Leila Kristesiashvili Tamar Chanturia	<i>Georgian Technical University, Georgia</i>	Analysis of Methods for Assessing the Quality of Construction Products
Ramaz Jghenti Mariam Kavrelishvili	<i>Georgian Technical University, Georgia</i>	Urbanization, Natural Resources and Ecorecosystems
Tamar Kvachadze	<i>Georgian Technical University, Georgia</i>	Numerical solution of a singular integral equation of the first kind in the case of a positive index on a section

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Tbilisi Local Time/ 11:00-13:00



Ankara Local Time/ 10:00-12:00

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HEAD OF SESSION: Prof. Dr. Mariam Avagyan

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Vladimir Moroz	<i>Brest State Technical University, Belorussia</i>	USE OF WASTEWATER SLUDGE FROM GALVANIC PRODUCTION IN THE CONSTRUCTION INDUSTRY
Igor Koliada Stepan Borchuk Bohdan Semenii	<i>Dragomanov Ukrainian State University, Ukraine</i>	THE FORMATION OF THE PERSONALITY OF GENERAL V. ZALUZHNYI IN THE CONTEXT OF THE HISTORICAL EPOCH
Prof. Dr. Mariam Avagyan Assist. Prof. Dr. Kristine Sahakyan	<i>National University Of Architecture And Construction Of Armenia, Armenia</i>	URBAN PLANNING POTENTIAL OF YEREVAN'S PRESERVED GREEN AREAS IN THE CONTEXT OF THE INTEGRATION OF NATURE, HISTORY, AND CONTEMPORARY CULTURE
Artur I. Nurgaliev Alena A. Nazarova Liudmila M. Bolsunovskaya	<i>National Research Tomsk Polytechnic University, Russia</i>	REDUCING FALSE ALARMS IN CONTINUOUS METHANE MONITORING AT OIL AND GAS FACILITIES USING A RECURRENT NEURAL NETWORK
Vladimir Moroz	<i>Brest State Technical University, Belorussia</i>	THE POSSIBILITY OF USING GALVANIC PRODUCTION WASTEWATER SLUDGE IN THE CONSTRUCTION INDUSTRY
Gogina Elena Spasibo Elena	<i>Institute of Building Physics of the Russian Academy of Architecture and Construction Sciences, Russia</i>	INTERMITTENT AERATION AS AN OPERATIONAL STRATEGY FOR EXCESS SLUDGE MINIMIZATION IN SMALL AND MEDIUM WASTEWATER TREATMENT PLANTS (A REVIEW)
Noe Nika Dekanosidze Aleksi Burduladze	<i>Georgian Technical University, Georgia</i>	SUSTAINABLE USE OF WASTE TIRES IN ROAD CONSTRUCTION: ENVIRONMENTAL AND ENGINEERING PERSPECTIVES
Ketevan Mdinaradze Lasha Kuprashvili	<i>Georgian Technical University, Georgia</i>	Resource-Efficient Construction: Economic Benefits and Strategies for Reducing Environmental Impact
Gurgenidze Beka Kipiani Gela Tabatadze Ana	<i>Georgian Technical University, Georgia</i>	APPLICATION OF THE NARANDIANI METHOD OF PILING IN LANDSLIDE-PRONE AREAS
Lia Balanchivadze Georgi Maisuradze	<i>Georgian Technical University, Georgia</i>	Comparative Analysis of Seismic Resistance and Stability of Multi-Story Reinforced Concrete Buildings Constructed Using Heavy and Lightweight Concrete
Maia Chanturia Giorgi Mamardashvili Merab Mamardashvili	<i>Georgian Technical University, Georgia</i>	Application of the Inertial Mass Separation Method to Enhance the Seismic Resistance of Buildings
Lecan Bogveradze Marina Javakhishvili	<i>Georgian Technical University, Georgia</i>	Building rehabilitation and reconstruction in compliance with environmental requirements.

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HEAD OF SESSION: Dr. Muhammad Usama

Authors	Affiliation	Presentation Title
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Salihu Salisu Aminu Ibrahim Bello Yahaya Yunusa Riko	<i>Umaru Musa Yar'adua University Katsina, Nigeria</i>	FOCUSING ON HIDDEN TRANSMISSION ROUTES IN THE QUEST TO ELIMINATE HEPATITIS B VIRUS (HBV) IN NIGERIA AND THE GLOBAL SOUTH: ROLES OF LOCAL HEALTHCARE FACILITIES AND COMMUNITIES
Verônica Baldon Fusinato, Clarice Steffens, Eduarda Alves da Fonseca, Laiane Racoski, Rogério Marcos Dallago, Juliana Steffens	<i>Universidade Regional Integrada do Alto Uruguai e das Missões – URI Erechim, Brazil</i>	PERFORMANCE EVALUATION OF A LABORATORY-SCALE MICROFILTRATION MEMBRANE IN THE TREATMENT OF POULTRY SLAUGHTERHOUSE EFFLUENTS
NABI Fahima OUNANE Sidi Mohamed	<i>1Université Dr Yahia Farès de Médéa, Algeria</i>	CIMPROVEMENT OF COWPEA (VIGNA UNGUICULATA) GERMINATION AND GROWTH UNDER SALT STRESS BY CALCIUM TREATMENT
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FETTOUCHE Abderrahim BOUZEKRAOUI Hicham	<i>Sultan Moulay Slimane University, Faculty of Arts and Humanities, Laboratory of Scene Dynamics, Risk and Heritage, Morocco</i>	QUANTITATIVE ASSESSMENT OF GEODIVERSITY IN THE CENTRAL HIGH ATLAS
Christianah Afoluke Gegeleso Olutayo Israel Falodun	<i>University of Ibadan, Nigeria</i>	DISTRIBUTION OF COLIFORM BACTERIA ISOLATED FROM CATTLE FAECAL SAMPLES OBTAINED FROM SELECTED LIVESTOCK FARMS IN IBADAN METROPOLIS, NIGERIA
Khatuna Mgebrishvili Khatia Kvabelashvili Nugzar Diasamidze	<i>Georgian Technical University, Georgia</i>	ENVIRONMENTAL ENGINEERING AND MODERN ECO-URBANISM: TBILISI'S TRANSPORT ECOSYSTEM AND FUTURE PERSPECTIVES

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HEAD OF SESSION: Dr. Muhammad Faisal

Authors	Affiliation	Presentation Title
FASEELA K L	<i>University Of Kerala, India</i>	KERALA AS A DIGITAL GATEWAY: EVALUATING THE ROLE OF SOUTHERN STATES IN INDIA'S ACT EAST POLICY FOR ASEAN E-GOVERNANCE COLLABORATION
Muhammad Faisal Atif Soomro	<i>University of SARAWAK Malaysia</i>	AI CHATBOT INTEGRATION IN E-LEARNING SYSTEMS
Saida Heydarova Aynura Gurbanova	<i>Odlar Yurdu University, Azerbaijan</i>	SOCIAL MEDIA AND YOUTH MENTAL HEALTH: A CRITICAL ANALYSIS OF PSYCHOLOGICAL OUTCOMES
Ratna Sari Waruwu Rezeki Putra Gulo Natalia Christy Megumi Kaunang Sianipar	<i>Universitas Kristen, Indonesia</i>	THE URGENCY OF THEOLOGICAL FOUNDATIONS AND NATIONAL POLICY IN SPIRITUALITY ASSESSMENT IN CHRISTIAN RELIGIOUS EDUCATION IN INDONESIA
Muhammad Aftab Muhammad Ali Raza Maria Javed Kashaf Arzoo Sajjad Haider Bhatti	<i>Government College University Faisalabad, Pakistan</i>	EVALUATING THE IMPORTANCE OF EXPERIMENTAL DESIGN FOR EFFICIENT LABORATORY DATA COLLECTION
Chinyere Onalu	<i>University of Nigeria, Nsukka, Nigeria</i>	I AM DEPRESSED: EFFECTS OF ACADEMIC STRESS ON MENTAL HEALTH OF UNDERGRADUATES IN NIGERIAN UNIVERSITIES
Ronal Limbong Paulus Simamora	<i>Universitas Kristen, Indonesia</i>	ESSENTIAL COMPONENTS OF AN EFFECTIVE EVALUATION SYSTEM IN CHRISTIAN RELIGIOUS EDUCATION
Markelino Albert D. Tingon Rati Juliana Manik Novita Anugracia Saragih	<i>Universitas Kristen, Indonesia</i>	STRENGTHENING EVALUATION ACCOUNTABILITY IN CHRISTIAN RELIGIOUS EDUCATION: A SYNTHESIS OF RESPONSIVE AND GOAL-FREE EVALUATION BASED ON CHRISTIAN STEWARDSHIP
Ferdinand Omoja	<i>Federal University of Allied Health Sciences, Trans-Ekulu, Enugu, Nigeria</i>	TRADITIONAL CONFLICT MANAGEMENT STRATEGIES AMONG THE IGBOS IN NIGERIA: A CASE FOR INDIGENOUS SOCIAL WORK KNOWLEDGE IN NIGERIA

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HEAD OF SESSION: Dr. Zineb ELABOUDI

Authors	Affiliation	Presentation Title
Olamilekan Akinlade Olusola Leramo Moruf Sangosina	<i>Federal Polytechnic, Nigeria</i>	EFFECTS OF AQUEOUS BULB AND RHIZOME EXTRACT ON FEATHER DEVELOPMENT OF BROILER CHICKENS
Zineb ELABOUDI	<i>University of HASSAN II Casablanca, Morocco</i>	RADIOLOGICAL RISK ASSESSMENT OF SOIL-TO-PLANT TRANSFER OF NATURAL AND ANTHROPOGENIC RADIONUCLIDES IN SEMI-ARID AGROECOSYSTEMS
Rajaa DIANY	<i>Sultan Moulay Slimane University, Morocco</i>	OPTIMIZATION OF NATURAL RED DYE EXTRACTION FROM MADDER USING RESPONSE SURFACE METHODOLOGY
<i>Onyinye Christiana Ogbu Ezeobele, K. O Oguike, M.A. Herbert, U.U.</i>	<i>Federal Polytechnic Oke, Nigeria</i>	TESTOSTERONE LEVELS OF HERITAGE TURKEYS ADMINISTERED AQUEOUS 'MORINGA OLEIFERA' LEAF AND SEED EXTRACTS
Mohanapriya Purushothaman Chamundeeswari Munusamy	<i>St. Joseph's College of Engineering, India</i>	SUSTAINABLE PRODUCTION OF BIO-OIL FROM CITRUS WASTE PEELS VIA THERMOCHEMICAL CONVERSION- A WASTE TO ENERGY APPROACH
Stephen Olamilekan Johnson Isreal Olutayo Falodun	<i>University of Ibadan, Ibadan, Nigeria</i>	ANTIBIOTIC SUSCEPTIBILITY PATTERNS OF VIBRIO SPECIES ISOLATED FROM SELECTED SWIMMING POOLS IN IBADAN, NIGERIA
Chinecherem Success, Ume Olutayo Israel Falodun Adebukola Rasheedat, Salawu	<i>University of Ibadan, Nigeria</i>	PREVALENCE OF BACTERIURIA AND ANTIBIOTIC RESISTANCE IN GRAM NEGATIVE BACTERIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN IBADAN, NIGERIA
Patience Faustinah, ACHINE Omowumi Janet, AJALA Linda Osaretim, IYAHEN Olawale Olufemi, ADELOWO	<i>University of Ibadan, Nigeria</i>	ISOLATION, CHARACTERISATION AND ANTIMICROBIAL SUSCEPTIBILITY OF NON-TUBERCULOUS MYCOBACTERIA FROM SOIL AND WATER SAMPLES COLLECTED FROM ZOOLOGICAL GARDEN AND HOSTELS IN THE UNIVERSITY OF IBADAN.

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Tbilisi Local Time/ 11:00-13:00



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HEAD OF SESSION: Prof. Dr. Asel Pazylova

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Mateevici Elena Denisa Mateevici Volodea	<i>National Institute for Economic Research "Costin C. Kirilescu", Institute of National Economy, Romania</i>	ARCHITECTURES OF SOCIAL MISSION IN SOCIAL ENTERPRISES: ASSESSING SOCIO- ECONOMIC IMPACT IN MARGINALIZED COMMUNITIES
Asel Pazylova Satybaldy Omurzakov	<i>Osh Technological University, Kyrgyzstan</i>	ENHANCING THE IMPLEMENTATION MECHANISMS OF TARGETED PROGRAMS FOR ATTRACTING FOREIGN INVESTMENT INTO THE REGIONS OF KYRGYZSTAN
Asel Pazylova Abdygapar kyzy	<i>Osh Technological University, Kyrgyzstan</i>	THE ROLE OF COMMERCIAL BANKS IN THE DEVELOPMENT OF THE GREEN ECONOMY IN THE KYRGYZ REPUBLIC
Omer Shujat Bhatti Mubashir Hassan Zia	<i>University of Management & Technology, Pakistan</i>	REVOLUTIONIZING REAL ESTATE THROUGH IMMERSIVE BUYING: VIRTUAL REALITY AS A VITAL ELEMENT FOR SUSTAINABLE ARCHITECTURE DESIGN SOLUTIONS OF HOUSING IN REAL ESTATE OF PAKISTAN.
Morel Marly MENSAH Sourou Desire Christel ZINSOUVI Jean NOUNANDONDE	<i>University of Parakou, Benin</i>	USING TASK-BASED GRAMMAR TO ENHANCE ESP LEARNERS' WRITING SKILLS IN MANAGEMENT CLASSES OF LYCÉE TECHNIQUE ET PROFESSIONNEL OF PORTO- NOVO (BENIN)
Victoria Amaka	<i>Shanahan University Onitsha, Nigeria</i>	A COMPARATIVE STUDY OF FINANCIAL PERFORMANCE OF MULTINATIONAL AND INDIGENOUS INDUSTRIAL GOODS FIRMS IN NIGERIA
Dóra Szendi	<i>University of Miskolc, Hungaria</i>	SMART CITY PERFORMANCE OF THE CENTRAL-EASTERN-EUROPEAN CAPITALS
Ayşe Tuğba GÖKGÖZ	<i>Tekirdağ Namık Kemal University, Turkey</i>	GREEN DEAL AND CARBON MARKET

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OPTIMIZING WINDOW SPACING: A TERMITE-INSPIRED STRATEGY FOR THERMAL COMFORT IN OFFICE BUILDINGS IN NIGERIA'S COMPOSITE CLIMATE

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Abstract

While numerous studies have investigated the impact of window openings, Window-to-Wall Ratio (WWR), window position and window spacing on indoor thermal comfort, many fail to provide comprehensive solutions that ensure adequate internal comfort across variable climatic conditions. These conventional approaches often result in suboptimal performance, leading to continued reliance on mechanical systems and occupant discomfort, as evidenced by case studies in Nigerian office buildings. This paper investigates the application of biomimetic principles, specifically those derived from termite mound ventilation systems, to optimize window placement and spacing for enhanced indoor thermal comfort in office buildings within Nigeria's temperate dry region. Drawing on a quantitative simulation methodology, the study analyzes the impact of varying distances between window openings (0.5m, 1.0m, 1.5m, and 2.0m) on key thermal comfort parameters. Simulation results for both peak solar and cooling hours demonstrate a clear correlation between increased window spacing and improved thermal performance. A distance of 2.0 metres between openings yielded the most favorable conditions, with the lowest recorded temperatures and the highest air velocities. An inferential statistical analysis (one-way ANOVA) confirmed that the differences in performance between the spacing configurations were statistically significant ($p < 0.01$ for all key variables). The findings robustly advocate for a dynamic, seasonally-responsive architectural design strategy, inspired by the adaptive nature of termite mounds, to reduce reliance on mechanical cooling systems and achieve sustainable thermal comfort.

Keywords: Biomimicry Office, Termite Mound, Thermal Comfort, Window spacing.

I AM DEPRESSED: EFFECTS OF ACADEMIC STRESS ON MENTAL HEALTH OF UNDERGRADUATES IN NIGERIAN UNIVERSITIES

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Abstract

Academic stress may be seen as the most dominant stress that affects the mental wellbeing of undergraduates. This study examines the effects of academic stress on mental health of undergraduates. Data was sourced through in-depth interviews organized for 14 students, and analysis was done thematically. Findings revealed depression, anxiety, mental fatigue, and mental disorder as the effects of academic stress on mental health of undergraduates. To address these problems, engaging social workers as welfare professionals is recommended. This research has the potential to strengthen the roles of social workers in helping to eradicate effects of academic stress on mental well-being. Future research may use a quantitative research design to have a general view of the factors promoting academic stress and the best methods in controlling stress, this will create room for better for better social services and an advancement in social service research.

Keywords: Academic stress, undergraduates, social work, mental health, Nigeria,

APPLICATION OF InSAR TECHNIQUES FOR MONITORING AND ANALYSIS OF LAND SUBSIDENCE

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Abstract

This paper provides a comprehensive review of the application of Interferometric Synthetic Aperture Radar (InSAR) techniques for monitoring and analyzing land subsidence. Land subsidence has become a critical environmental and socio-economic issue worldwide, often associated with groundwater overexploitation, urbanization, and natural geological processes. In recent decades, InSAR has emerged as a powerful remote sensing tool, offering high spatial resolution, wide-area coverage, and the capability to detect millimeter-scale ground deformation. The review synthesizes recent scientific contributions focusing on different InSAR approaches, including Differential InSAR (D-InSAR), Persistent Scatterer InSAR (PS-InSAR), and Small Baseline Subset (SBAS) techniques. It examines their methodological principles, advantages, and limitations in capturing subsidence dynamics across diverse environmental contexts. Particular attention is given to the integration of InSAR data with hydrogeological and geotechnical information to better understand the driving mechanisms of land subsidence.

Furthermore, the paper discusses key challenges related to data processing, atmospheric effects, temporal decorrelation, and the interpretation of displacement signals. It also highlights recent advancements in time-series analysis, multi-sensor data fusion, and machine learning approaches that enhance the accuracy and reliability of subsidence monitoring. By providing a structured synthesis of existing studies, this review contributes to a deeper understanding of the capabilities and limitations of InSAR techniques. It also identifies research gaps and future directions, particularly in improving the integration of remote sensing data with ground-based observations for sustainable land and water resource management.

PREVALENCE OF BACTERIURIA AND ANTIBIOTIC RESISTANCE IN GRAM-NEGATIVE BACTERIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN IBADAN, NIGERIA

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Abstract

Urinary Tract Infections (UTIs) represent the most common bacterial infections world wide. Gram-negative bacteria are the main causative agents, with significant reports of antimicrobial resistance. The rapid increase and spread of antibiotic resistance among Gram-negative bacteria have become a major global public health concern posing serious challenges to effective treatment. This study was aimed at determining the prevalence and antibiotic susceptibility pattern of Gram-negative bacteria isolated from urine samples of pregnant women in Ibadan, Nigeria.

A total of 60 Gram-negative bacteria previously isolated from urine samples of pregnant women were collected from the pathogenic laboratory of the University of Ibadan. They were identified using standard microbiological methods and biofilm production was determined using Congo red method. Antibiotic susceptibility testing was carried out using the Kirby Bauer disk diffusion method against cefotaxime, cefuroxime, imipenem, gentamicin, nalidixic acid, ofloxacin, levofloxacin, Ceftazidime, Nitrofurantoin, amoxicillin clavulanate.

Out of 60 isolates collected, 58 were viable and 65.6% were biofilm producers. The resistance pattern of the isolates showed that resistance to cefexime was 87.9%, 79.3% to ceftriaxone, 98.3% to cefuroxime, 87.9% to cefotaxime, 94.8% to imipenem, 89.7% to Nitrofurantoin, 91.4% to amoxicillin clavulanate. However, none of the isolates showed resistance to levofloxacin and nitrofurantoin. The observation showed that 63% of the isolates were multidrug resistance. The high resistance to commonly used antibiotics observed calls for a need of routine urine culture screening during antenatal care as well as continuous surveillance of antibiotic resistance and prudent antibiotic use to reduce maternal and neonatal health complication.

Keywords: Antimicrobial resistance, UTI, Gram negative bacteria

DISTRIBUTION OF COLIFORM BACTERIA ISOLATED FROM CATTLE FAECAL SAMPLES OBTAINED FROM SELECTED LIVESTOCK FARMS IN IBADAN METROPOLIS, NIGERIA

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Abstract

Presence of bacteria in livestock faeces is not in itself a public health concern as these microbes exist as normal commensals, the real concern is the pathogenic potential of these bacteria as they enter into the environmental and human interface. This study was designed to determine the distribution of total bacteria and total coliforms present in the faeces of bulls and cows.

A total of 100 faecal samples were obtained from bulls and cows at five different livestock farms within Ibadan metropolis, Nigeria. Samples were collected every fortnight, with the aid of sterile spatula and dispensed into sterile sample bottles. The samples were transported in ice-box to the Postgraduate laboratory of the Department of Microbiology, University of Ibadan for further microbiological analysis. Appropriate serially diluents were plated on sterile molten nutrient agar (NA) and MacConkey Agar (MA) for determination of total heterotrophic bacterial count and total coliform count, respectively. Bacteria with distinct morphology present on MA were purified via series of streaking to obtain pure culture, which was identified via basic morphological and biochemical tests.

The highest total heterotrophic bacterial count and the total coliform count were recorded in farm A, with count of $4.21 \pm 1.47 \text{ LogCFU mL}^{-1}$ and $3.47 \pm 2.30 \text{ LogCFU mL}^{-1}$ respectively for bull while farm D had the highest total bacterial count and the total coliform count of $3.65 \pm 1.89 \text{ LogCFU mL}^{-1}$ and $4.01 \pm 1.72 \text{ LogCFU mL}^{-1}$ for cow respectively. A total of 21 isolates were recovered in pure culture. The isolates were identified as *Klebsiella* spp. (9), *Enterobacter* spp. (7), *Escherichia coli* (3), and *Salmonella* spp. (2).

This study showed that faecal samples recovered from cattle contain different bacterial species of public health concern, as such, care must be taken in management of cattle, as well as avoid contamination of food and water with faeces from these farms to avoid illnesses.

Keywords: Faeces, Coliform, *Klebsiella*, *Enterobacter*

APPLICATION OF THE INERTIAL MASS SEPARATION METHOD TO ENHANCE THE SEISMIC RESISTANCE OF BUILDINGS

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Abstract

Unlike traditional seismic-resistant structures, which attempt to absorb energy through the plastic deformation of materials, the presented method is based on a fundamental change in the dynamic characteristics of the building. The primary objective of this research is to substantiate a mechanism that allows for the separation of the building's main mass from its load-bearing system, thereby reducing the inertial forces transmitted by seismic waves. The article analyzes seismic isolation systems utilizing spring-dampers and flexible connections. The core of the method lies in ensuring that, during an earthquake, the building's inertial mass does not move synchronously with the ground. This is achieved through: **Mass Separation:** Implementing special joints and dampers between structural components, **Increasing the Natural Vibration Period:** Shifting the building away from the resonance zone. The research findings demonstrate that the separation of inertial masses reduces inter-story drift and peak accelerations by **30-50%**. The article presents a mathematical model describing the system's behavior during earthquakes of varying magnitudes. The mass separation method represents a highly efficient and economically viable solution for protecting high-rise buildings, particularly in high seismic activity zones, as it minimizes both structural damage and human casualties.

ROAD INFRASTRUCTURE AND ECO-URBANISM: ENGINEERING APPROACHES TO SUSTAINABLE ROAD INFRASTRUCTURE

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Abstract

Rapid urbanization and the development of transportation systems in modern cities significantly increase the infrastructural pressure on the urban environment. Road infrastructure represents one of the fundamental elements of the economic and social development of cities; however, its intensive expansion often leads to environmental challenges such as air pollution, increased noise levels, and the degradation of natural ecosystems. Eco-urbanism represents a contemporary concept of urban planning aimed at achieving the harmonious integration of infrastructure with the natural environment. This paper discusses the role of road infrastructure in eco-urban development, the principles of green road infrastructure, and modern engineering solutions aimed at improving environmental sustainability in urban transportation systems.

Keywords: eco-urbanism, road infrastructure, green roads, sustainable transportation.

ARCHITECTURES OF SOCIAL MISSION IN SOCIAL ENTERPRISES: ASSESSING SOCIO-ECONOMIC IMPACT IN MARGINALIZED COMMUNITIES

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Abstract

This paper investigates the architectures of social mission within social enterprises and evaluates their socio-economic impact in marginalized communities. Anchored in the interdisciplinary fields of social economy, development studies, and organizational theory, the study conceptualizes social mission architecture as the configuration of values, governance structures, operational strategies, and impact measurement practices that guide social enterprises in pursuing dual economic and social objectives.

Employing a mixed-methods research design, the study integrates qualitative case studies of selected social enterprises operating in marginalized contexts with quantitative impact assessment indicators related to employment generation, income stability, social inclusion, and community capacity building. The findings reveal that variations in mission architecture - particularly in governance models (participatory vs. centralized), revenue strategies (market-driven vs. grant-supported), and stakeholder engagement - significantly influence both the depth and sustainability of socio-economic impact.

The analysis demonstrates that enterprises adopting hybrid and adaptive mission architectures tend to generate more resilient and transformative outcomes, fostering not only economic empowerment but also strengthening social capital and local agency. Conversely, rigid or poorly aligned mission structures may limit scalability and long-term impact.

The paper contributes to the theoretical refinement of social enterprise models by proposing a typology of social mission architectures and offers practical implications for policymakers, practitioners, and stakeholders aiming to enhance the effectiveness of social enterprises in marginalized settings. It underscores the need for context-sensitive, flexible mission design and robust impact evaluation frameworks to maximize inclusive and sustainable development outcomes.

Keywords: social enterprises, social mission architecture, marginalized communities, socio-economic impact, social innovation, impact assessment.

ENHANCED CATALYTIC CONVERTER SIMULATION FOR IMPROVED AIR POLLUTION CONTROL

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Abstract

Automobile emissions, including nitrogen oxides, carbon monoxide, and hydrocarbons, continue to contribute significantly to environmental pollution, producing low-level ozone and photochemical smog that are harmful to humans and ecosystems. Catalytic converters are essential devices for reducing such emissions by transforming hazardous gases into less harmful compounds. Building on previous studies, this work presents an enhanced simulation of catalytic converters using ANSYS Fluent, focusing on design optimization to further improve pressure distribution, inlet velocity effects, and gas conversion efficiency. The study evaluates a converter configuration with three planes, each containing two oxidation and reduction blocks, and compares its performance with conventional models. Results indicate that this optimized design not only transforms three toxic gases efficiently but also achieves improved flow dynamics and thermal stability, providing practical insights for cleaner automotive emissions. This research demonstrates the potential of computational modeling to guide the design of more effective catalytic converters, supporting sustainable engineering practices and providing a foundation for further experimental and computational studies in applied physics and environmental engineering.

Keywords: ANSYS Fluent; Air Pollution; Catalytic Converter; Gas Transformation; Platinum; Palladium; Rhodium

ON THE NUMERICAL SOLUTION OF SINGULAR INTEGRAL EQUATIONS WITH HIGH-ORDER ACCURACY SCHEMES IN THE CASE OF NON-ZERO INDEX

Tamar Kvachadze

Abstract

Singular integral equations of the first kind in the case of positive index are considered, many practical, applied problems are reduced to such equations: hydro and aerodynamics, elasticity theory, construction mechanics, etc. As studies of well-known sciences have shown, the method of singular integral equations is the most effective for the numerical solution of such problems. Singular integrals themselves and the corresponding equations are of a complex nature (singular integrals do not exist in the usual sense, they exist in the so-called Cauchy principal value), but singular integrals best reflect the complexity of the numerical solution of the problems to be solved.

Algorithms for numerical solution of high-order accuracy are built on singular integral equations of the first kind. The corresponding accuracy order is estimated.

Using the mentioned algorithms, a practical specific problem of mechanics is solved. The obtained result is analyzed. Based on the selection of constants, we obtain solutions in different classes of functions.

A computer implementation program is written in one of the most modern “WolframAlfa” computer languages.

As is known, in the case of a non-zero index, the solution is not uniquely determined, which causes additional difficulties in the case of numerical solutions. These difficulties presented in the mentioned work are overcome.

გარემოს ინჟინერია და მწვანე სამეწარმეო აზროვნების ფორმირება ახალგაზრდებში
ENVIRONMENTAL ENGINEERING AND THE FORMATION OF GREEN ENTREPRENEURIAL
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ამ ორი მცნების ურთიერთინტეგრაცია დღეს განსაკუთრებით აქტუალურია, რადგან ეკოლოგიური გამოწვევები და ეკონომიკური განვითარება ერთმანეთთან სულ უფრო მჭიდროდ არის დაკავშირებული და ქმნიან ერთიან ეკოსისტემას.

გარემოს ინჟინერია არის ინჟინერიის დარგი, რომელიც მიზნად ისახავს გარემოს დაცვასა და ბუნებრივი რესურსების მდგრად გამოყენებას, ხოლო მისი მთავარი მიზანია შექმნას ტექნიკური და პრაქტიკული გადაწყვეტილებები, რომლებიც ერთდროულად უზრუნველყოფს ეკონომიკურ განვითარებას და გარემოს დაცვას, მწვანე მეწარმეობა გულისხმობს ისეთი ბიზნეს გარემოს შექმნას და საქმიანობის წარმართვას, რომელიც ორიენტირებულია ეკოლოგიურ პასუხისმგებლობასა და მდგრადობაზე, რაც თავის მხრივ მოიცავს:

- რესურსების ეფექტურ გამოყენებას
- ეკოლოგიურად სუფთა პროდუქციის შექმნას
- ნარჩენების მინიმიზაციას
- სოციალური პასუხისმგებლობის ამაღლება-გაზიარებას

ახალგაზრდები არიან მომავალი ეკონომიკისა და ინოვაციების მთავარი ძალა. მათი აღნიშნული მიმართულებით, ცნობიერების ამაღლება იწვევს ეკოლოგიურად პასუხისმგებლიანი ქცევის ჩამოყალიბებას, ინოვაციური, მდგრადი ბიზნეს იდეების გენერირებას, და, როგორც შედეგი, ადგილობრივი და გლობალური ეკოლოგიური პრობლემების შემცირებას.

თანამედროვე კვლევები ხაზს უსვამს, რომ საინჟინრო განათლებაში მდგრადობის ინტეგრაცია აუცილებელია ახალი თაობის ინოვაციების ფორმირებისთვის, ვინაიდან სახეზე გვაქვს განათლების სისტემაში მწვანე თემების არასაკმარისი ინტეგრაცია:

- ფინანსური რესურსების შეზღუდულობა
- ახალგაზრდების დაბალი პრაქტიკული გამოცდილება
- ეკოლოგიური ცნობიერების არასაკმარისი დონე

ამ პრობლემების გადაჭრა საჭიროებს სისტემურ მიდგომას:

- ახალგაზრდების განათლება, მხარდაჭერა და ჩართულობა არის მთავარი ფაქტორი, რომელიც განსაზღვრავს მომავალი მწვანე ეკონომიკის წარმატებას;
- გარემოს ინჟინერია და მწვანე სამეწარმეო აზროვნება წარმოადგენს მდგრადი განვითარების საფუძველს. მათი ინტეგრაცია ახალგაზრდებში კი ხელს უწყობს ეკოლოგიურად

პასუხისმგებელი საზოგადოების ჩამოყალიბებას, ინოვაციური ეკონომიკის განვითარებას და გლობალური გარემოსდაცვითი პრობლემების შემცირებას.

A SYSTEMATIC APPROACH TO HIGHWAY TRAFFIC ANALYSIS AND OPERATIONS

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ABSTRACT

The purpose of this technical article is to discuss the fundamental principles of highway traffic analysis and operations, emphasizing that system efficiency is primarily dictated by human behavior. It highlights how a highway's capacity is constrained by driver-perceived safe distances, creating a dynamic relationship between speed, vehicle spacing, and the "supply and demand" of infrastructure usage. The article identifies congestion as the result of synchronized demand exceeding available capacity and notes that transportation agencies seek cost-effective strategies to optimize user experience.

Serving as an introduction to highway engineering, this article focuses on three key objectives: 1 - Establishing field observations as the gold standard for reliable operational data; 2 - Analyzing the relationship between traffic flow behavior and potential roadway improvements; 3 - Identifying established analytical methods used to evaluate and enhance highway performance.

Key words: Capacity; Highway; Flow; Operation; Speed; Traffic.

ISOLATION, CHARACTERISATION AND ANTIMICROBIAL SUSCEPTIBILITY OF NON-TUBERCULOUS MYCOBACTERIA FROM SOIL AND WATER SAMPLES COLLECTED FROM THE ZOOLOGICAL GARDEN AND HOSTELS IN THE UNIVERSITY OF IBADAN

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Abstract

Non-tuberculous Mycobacteria (NTM) are opportunistic pathogens widely distributed in environmental reservoirs. They pose significant public health concerns due to their virulence and intrinsic resistance to multiple antibiotics. This study aimed to isolate, characterise, and assess the antimicrobial susceptibility patterns of NTM from soil and water samples collected from animal enclosures in the Zoological Garden, as well as plumbing systems in two Female hostels at the University of Ibadan, Nigeria. A total of 68 NTMs were isolated from water, soil and swab samples collected from animal enclosures, hostel plumbing systems, and soil environments. Biochemical characterisation, including catalase, citrate utilization, nitrate reduction, urea hydrolysis, Tween 80 hydrolysis, growth on MacConkey agar without crystal violet, iron uptake, and NaCl tolerance tests, confirmed the probable identities of diverse NTM species. The identified isolates included *Mycobacterium fortuitum*, *Mycobacterium abscessus*, *Mycobacterium chelonae*, *Mycobacterium kansasii*, *Mycobacterium marinum*, *Mycobacterium avium*, *Mycobacterium gordonae*, and *Mycobacterium malmoense*. Antimicrobial susceptibility testing using the broth micro-dilution method revealed high resistance rates to ciprofloxacin (78.6%), imipenem (95%), and sulphamethoxazole (100%) underscoring the occurrence of resistance to antibiotics used in the treatment of NTM infections within the university community. These findings underscore the urgent need for stringent environmental monitoring and research to assess NTM resistance patterns within environmental reservoirs in the university community. This is necessary to guide effective public health interventions and clinical management strategies. Further research should explore whole-genome sequencing to elucidate resistance mechanisms and alternative treatment options.

Keywords: Non-tuberculous Mycobacteria (NTM), Antimicrobial resistance, Public health interventions

AI CHATBOT INTEGRATION IN E-LEARNING SYSTEMS

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ABSTRACT

This research explores the integration of an AI-based chatbot in an e-learning system to provide automated student support and improve the learning experience. The chatbot is designed using Natural Language Processing (NLP) techniques to answer student queries related to courses, schedules, assignments, and examination information. The system is developed using the MERN stack, where MongoDB stores frequently asked questions and conversation data, Express and Node.js manage chatbot APIs, and React provides the chat interface for users. The AI chatbot can respond to student queries in real-time, reducing the workload on administrative staff and instructors. The system also uses machine learning techniques to improve chatbot responses over time by analyzing user interactions. The implementation of the chatbot improves communication between students and the institution and provides 24/7 support services. The research concludes that AI chatbots can play a significant role in modern LMS platforms by providing intelligent assistance and improving student engagement.

Keywords: AI Chatbot, Natural Language Processing, E-Learning, LMS, MERN Stack, Student Support System.

AIR QUALITY ENGINEERING SOLUTIONS AND LEGAL ENFORCEMENT: EVALUATING INDIA'S FRAMEWORK FOR URBAN AIR POLLUTION CONTROL

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ABSTRACT

Urban air pollution constitutes one of the most pressing environmental and public health crises confronting India in the twenty-first century. With fourteen of the twenty most polluted cities in the world located within its borders, India faces an acute deficit between the engineering solutions available for air quality management and the legal mechanisms deployed to enforce compliance. This paper critically evaluates India's regulatory and legal framework for controlling urban air pollution, analysing the intersection of environmental engineering interventions including source apportionment technologies, continuous ambient air quality monitoring networks, vehicular emission controls, and industrial stack emission regulations with the legislative, institutional, and judicial architecture governing their implementation. Drawing on empirical air quality data from the Central Pollution Control Board (CPCB), the World Health Organization's Global Air Quality Database, and IQAir's World Air Quality Reports (2019-2023), the paper demonstrates that India's major cities consistently and significantly exceed both national ambient air quality standards (NAAQS) and WHO guidelines across key pollutants, including PM_{2.5}, PM₁₀, nitrogen dioxide, and ground-level ozone. The paper examines the principal legal instruments governing air quality, which is the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act 1986, and the National Green Tribunal Act 2010 alongside policy frameworks including the National Clean Air Programme 2019 (NCAP) and the Graded Response Action Plan (GRAP). It critically assesses enforcement gaps, institutional fragmentation, the judiciary's evolving role through landmark Supreme Court and National Green Tribunal decisions, and the structural inadequacy of penalty regimes relative to the scale of non-compliance. The paper further evaluates the Commission for Air Quality Management in National Capital Region and Adjoining Areas Act 2021 as a recent legislative intervention and identifies systemic barriers to effective enforcement. It concludes by proposing an integrated legal-engineering governance framework emphasising real-time monitoring accountability, deterrent liability regimes, inter-agency coordination, and alignment with international best practices.

Keywords: Air quality; Urban pollution; NAAQS; National Clean Air Programme; National Green Tribunal; Legal enforcement

TESTOSTERONE LEVEL OF HERITAGE TURKEYS ADMINISTERED AQUEOUS *Moringa oleifera* LEAF AND SEED EXTRACTS

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Abstract

The study examined testosterone levels of heritage turkey toms administered aqueous *Moringa oleifera* leaf and seed extracts. The study was carried out with 36 heritage turkeys of about 8 to 9 weeks old. There were nine turkeys per treatment, grouped as; T₁ (control) T₂ (1% seed w/v) T₃ (0.5% leaf and 0.5% seed w/v) and T₄ (1% leaf w/v). Each group was replicated three times with three turkeys per replicate. The study lasted for 154 days with all routine management practices duly observed. Data was collected from two millimeters (2mls) of blood collected on the 152nd day of the study. The testosterone concentration was determined using microplate immune Enzymometric assay kit (DS-EIA-STERIOD-TESTOSTERONE-RT). Blood samples were collected from three male turkeys from each treatment group via the wing web. Data collected was statistically analyzed using SPSS package. There were significant ($P < 0.05$) difference on testosterone hormonal assay done among the treatment groups, T₄ (3.33 ± 0.3^a) T₃ (0.39 ± 0.3^b) T₂ (0.27 ± 0.3^c) T₁ (0.2 ± 0.2^c). Testosterone is known to stimulate the formation of spermatogonia, hence higher levels found in the leaf extract administered group implies more sperm cell production. Thus confirming previous studies that increase in testosterone will promote sperm cell production as well as sperm cell quality. Hence it is safe to conclude that, using *Moringa* leaves has great potential in improving the semen as well as general reproductive performance of heritage turkey toms.

Key words: hormone, turkey leaf and seed extracts.

FOCUSING ON HIDDEN TRANSMISSION ROUTES IN THE QUEST TO ELIMINATE HEPATITIS B VIRUS (HBV) IN NIGERIA AND THE GLOBAL SOUTH: ROLES OF LOCAL HEALTHCARE FACILITIES AND COMMUNITIES

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Abstract

Hepatitis B virus (HBV) remains a major global public health challenge, with an estimated 254 million people living with chronic HBV infection worldwide. The burden is disproportionately concentrated in low and middle-income regions, particularly the World Health Organization African Region. This is linked to gaps in prevention, diagnosis, and treatment, leading to sustained transmission. In Nigeria, HBV is persistently endemic, with overall hepatitis B surface antigen (HBsAg) prevalence ranging from 5.4% to 13.6% in the general population. Furthermore, widespread underdiagnosis and weak surveillance systems further obscure the true epidemiological picture of HBV, and limit targeted interventions. This review examines the hidden spread of HBV in micro-settings where repeated blood exposure occurs, including healthcare facilities, barbershops, and nail-care services. This hidden transmission can occur through inconsistent sterilization and sharps reuse; hence, such environments enable silent transmission, sustaining infection within households, workplaces, and community networks, especially where routine screening is limited. Despite the substantial public health burden of chronic HBV infection in Nigeria and similar Global South settings, responsible for millions of cases of liver cirrhosis, hepatocellular carcinoma, and premature mortality; and the availability of effective vaccines and antiviral therapies, access and implementation remain inadequate. Therefore, devising new control strategies address those hidden transmission routes is essential. To this end, key control strategies, including universal birth-dose vaccination, catch-up immunization, routine screening of high-risk populations, improved infection prevention practices, safe instrument sterilization, and strengthened linkage to antiviral care are recommended, towards a coordinated, context-specific approach essential for reducing transmission and advancing HBV elimination.

Keywords: Epidemiology, Fomites, Haematological screening, Infection Prevention and Control, Public health, Vaccination

SHRINKAGE BEHAVIOR OF CEMENT-BASED COMPOSITES

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ABSTRACT

This study investigates the shrinkage topics of cement-based construction composites and presents an experimental–theoretical model describing shrinkage across the full spectrum of ambient relative humidity (A.R.H.) $100 \div 0$ %. Six composite types were examined: concrete, fine concrete, steel-fiber concrete, basalt-fiber concrete, self-compacting concrete, and high-strength concrete.

Results demonstrate that shrinkage in the A.R.H. range of $100 \div 35$ % is governed primarily by stresses induced by the evaporation of physically–mechanically bound water. In contrast, shrinkage in the $35 \div 0$ % range is driven by the loss of physically–chemically bound water. A critical moisture content W_{kp} , corresponding to 35 % A.R.H., was identified. The value of W_{kp} is nearly identical across all composite types and is independent of material age t_0 .

Across the entire range of ambient relative humidity ($100 \div 0$ %), the dependence of composite shrinkage deformations on the moisture content of the materials is nonlinear. To describe shrinkage deformations, it is necessary to use two different linear shrinkage coefficients, β_y and β'_y : β_y for the $100 \div 35$ % humidity range and β'_y for the $35 \div 0$ % humidity range. In this way, the nonlinear shrinkage problem for composites is solved.

The law governing the dependence of the coefficients β_y and β'_y on the age t_0 of composites has been determined, and corresponding expressions have been developed using power-function relationships.

These coefficients enable the formulation and solution of the nonlinear shrinkage problem. Age-dependent relationships for β_y and β'_y were established using power-function approximations.

A universal shrinkage model has been developed for cement-based composites, which describes the real shrinkage processes of composites across the entire ambient relative humidity range of $100 \div 0$ %, and considers the structure of the materials, their moisture content W , and their age t_0 .

Keywords: Shrinkage; composite; cement-based; moisture content; age; model

ГРАДОСТРОИТЕЛЬНЫЙ ПОТЕНЦИАЛ СОХРАНИВШИХСЯ ЗЕЛЁНЫХ ТЕРРИТОРИЙ ЕРЕВАНА В КОНТЕКСТЕ ИНТЕГРАЦИИ ПРИРОДЫ, ИСТОРИИ И СОВРЕМЕННОЙ КУЛЬТУРЫ

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Абстракт

Городские зелёные территории являются одним из важнейших условий формирования здоровой и устойчивой городской среды, способствуя регулированию микроклимата, сохранению биоразнообразия и повышению качества жизни населения. В программах развития Еревана отмечается, что зелёные зоны составляют около 30% общей площади города, однако анализ представленных данных показывает, что фактическая площадь общественных зелёных территорий в расчёте на одного жителя значительно ниже официально заявленных показателей. Согласно расчётам, данный показатель составил 5,02 м² в 2019 году и сократился до 4,4 м² в 2023 году.

В этих условиях особую значимость приобретают сохранившиеся фрагменты городских зелёных территорий, такие как лесопарк Джрвеж, зелёный холм Цицернакаберда и сады Далмы. В работе исследованы историческое развитие данных территорий, их пространственные изменения, а также их экологическое и культурное значение. Так, из примерно 790 га садов Далмы, существовавших ранее, в настоящее время сохранилось около 230 га, обладающих значительным потенциалом для стабилизации микроклимата Еревана, сохранения биоразнообразия и восстановления городских экосистем.

В работе предлагается придать данным территориям статус особо охраняемых природных территорий, а также применять на них природоориентированные подходы к восстановлению, включая восстановление местных видов растительности, внедрение систем управления дождевыми водами и развитие экотуризма. Представленные инновационные предложения могут способствовать устойчивому развитию Еревана, сохранению зелёных территорий и смягчению городских экологических проблем.

Ключевые слова: охраняемые природные территории, устойчивое городское развитие.

GREEN DEAL AND CARBON MARKET

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ABSTRACT

The world began to undergo a global change with the Industrial Revolution, which began to emerge at the end of the 18th century. Since these years, while the production and development capacity has increased day by day with the rapidly increasing industrialization and industrialization activities, natural resources have started to run out rapidly and many problems have occurred as the output of these developments. Our rapidly declining natural resources and the environment that has been destroyed and polluted have compelled the modern economy of the 21st century to take global measures, to make agreements and contracts. While efforts to raise awareness on the environment have been continuing by preparing international agreements and protocols such as the Stockholm Conference, the Kyoto Protocol, and the Paris Climate Agreement since the 1980s, a big step has been taken in terms of being climate neutral by forming the European Green Consensus in 2019 by the European Union. EU announced that it will be the first carbon neutral continent in 2050. In this study, what is the purpose of the European Green Deal, what are its scopes, the steps that Turkey, which has a high import and export relationship with the EU, will take within the scope of this agreement, the action plans to be implemented, the carbon market in the world and in Turkey will be examined.

Keywords: Grean Deal, Carbon Market, Sustainability, Carbon Pricing, Emission Trading, Climate Change

PROTECTING THE ENVIRONMENT IS ONLY POSSIBLE WHEN EVERYONE REALIZES THE NEED FOR IT

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Abstract

In Georgia, the issue of raising environmental awareness among young people is acute, which aims to form responsible behavior among citizens and, especially, adolescents/students/youth.

The competent bodies in the field of water resources protection and use of water resources in Georgia are: Ministry; Ministry of IDPs from the Occupied Territories, Labor, Health and Social Protection of Georgia; Ministry of Infrastructure of Georgia; Ministry of Justice of Georgia; Ministry of Economy and Sustainable Development of Georgia; National Energy and Water Supply Regulatory Commission of Georgia; Municipalities; Government bodies of the autonomous republics of Georgia. At the initiative of the Education Center in the regions of Georgia, representatives of the Center organize meetings with public school students on environmental issues.

The goal of these meetings is to ensure equal access to environmental and agricultural education for all children, regardless of their place of residence. The meetings gradually cover all municipalities and villages, with special attention paid to vulnerable communities, so that each student has a real opportunity to develop and make informed choices.” From September 1, 2026, the Law on Water Resources Management, adopted back in 2023, which provided for the introduction of European water management norms, came into force.

Keywords: water resources, among young people, education, environmental protection.

PRODUCTION, CHARACTERIZATION, AND EVALUATION OF THE PERFORMANCE OF ULEXITE-DOPED POLYURETHANE FOAMS AS TARGET MATERIALS FOR PROTON-BORON FUSION EXPERIMENTS

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Abstract

Proton-Boron (pB) fusion ($p + {}^{11}\text{B} \rightarrow 3\alpha + 8.7 \text{ MeV}$) has gained prominence in recent years as an aneutronic and environmentally friendly fusion reaction due to its low neutron production. Since 2005, hydrogen- and boron-rich target materials have been extensively investigated as potential targets for laser-driven pB fusion experiments aimed at sustainable energy production. However, laser energy conversion is limited due to significant energy losses in conventional solid targets. In particular, highly porous H/B-rich materials can mitigate this limitation by enhancing laser absorption; however, such materials are difficult to obtain and are in high demand. In this context, boron-doped polyurethane foams are proposed in this study as a low-cost, scalable, and structurally tunable alternative target material. In this study, polyurethane foams with 10% by weight ulexite ($\text{NaCaB}_5\text{O}_9 \cdot 8\text{H}_2\text{O}$) doped were produced in a controlled manner under a unique method in laboratory conditions, to be used as target materials for laser-driven pB fusion experiments. To evaluate the suitability of the produced foams as target materials in pB fusion experiments, their morphological structures were examined using Scanning Electron Microscopy (SEM), their specific surface area and porosity properties were determined using the Brunauer-Emmett-Teller

(BET) method, and their thermal stability was assessed using Thermogravimetric Analysis (TGA), and their chemical bond characteristics via Fourier Transform Infrared Spectroscopy (FTIR).

Keywords: Sustainable energy, Target material, Laser-driven proton-Boron fusion, Ulexite-doped polyurethane foams.

SUSTAINABLE AND CLIMATE RESILIENT ROAD INFRASTRUCTURE IN GEORGIA: INTEGRATION OF ENGINEERING, ENVIRONMENT, AND URBAN DEVELOPMENT

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Abstract

Road infrastructure represents a fundamental component of Georgia's transport system, directly influencing country's economic development, mobility efficiency and urban growth. In recent years, the need to incorporate sustainability and climate resilience into road engineering practice has become increasingly important. This article focuses on engineering based approaches for improving the long term performance and environmental compatibility of road infrastructure in Georgia. It discusses key aspects of sustainable road design, including pavement structure optimization, the use of durable and resource-efficient materials, and engineering strategies aimed at extending pavement service life. Particular attention is given to the influence of temperature variations, behavior of traffic loading on pavement and deterioration mechanisms. In urban contexts, the paper discusses the evolving role of streets within eco-urban development, emphasizing the integration of transport functionality with spatial efficiency and user-oriented design. Furthermore, the application of Geographic Information Systems is considered as a main tool for infrastructure planning and further management. Based on current practices and conditions in Georgia, the paper proposes a framework for integrating traditional road engineering principles with sustainability oriented design. The findings demonstrate that technically optimized pavement systems and modern planning approaches can significantly enhance road infrastructure durability while contributing to more efficient and sustainable transport networks.

Keywords: Road infrastructure; pavement engineering; sustainable design; GIS; eco-urban streets; Georgia

SUSTAINABLE PRODUCTION OF BIO-OIL FROM CITRUS WASTE PEELS VIA THERMOCHEMICAL CONVERSION- A WASTE TO ENERGY APPROACH

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ABSTRACT

The valorization of agro-industrial waste into renewable energy resources has gained significant attention as a sustainable strategy to address environmental and energy challenges. In this study, bio-oil was produced from citrus waste peels through thermochemical conversion, utilizing abundant residues such as orange, lemon, and lime peels generated from food processing industries. The feedstock was subjected to controlled pyrolysis under optimized conditions of temperature, heating rate, and residence time to maximize liquid yield. The resulting bio-oil was characterized using advanced analytical techniques including GC–MS, FTIR, and proximate analysis to determine its chemical composition and physicochemical properties. The analysis revealed that the bio-oil predominantly contains oxygenated compounds, hydrocarbons, and valuable bioactive constituents such as limonene, making it a potential candidate for renewable fuel and industrial applications. The yield and quality of bio-oil were significantly influenced by process parameters, with optimal conditions producing higher energy density and improved stability. Furthermore, the study highlights the environmental benefits of reducing citrus waste accumulation while simultaneously generating value-added products. Overall, this research demonstrates an efficient and eco-friendly approach for converting citrus peel waste into bio-oil, contributing to circular economy practices and sustainable bioenergy production.

Keywords: Waste valorization, Limonene, GC–MS analysis, Sustainable biofuel, Circular economy

A COMPARATIVE STUDY OF FINANCIAL PERFORMANCE OF MULTINATIONAL AND INDIGENOUS INDUSTRIAL GOODS FIRMS IN NIGERIA

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Abstract

This study investigated the comparative financial performance of multinational and indigenous industrial goods firms in Nigeria between 2015 and 2024. An ex post facto research design was adopted, relying on audited financial statements from ten purposively selected firms. Descriptive statistics showed that the average Return on Assets (ROA) was 7.253%, Return on Equity (ROE) was 12.842%, and Tobin's Q averaged 1.421, with variations across firm types. Independent t-tests revealed that multinational firms significantly outperformed indigenous firms in ROA (8.152% vs. 6.354%; $t = 2.144$, $p = 0.035$) and Tobin's Q (1.672 vs. 1.174; $t = 3.289$, $p = 0.001$), while no significant difference was found for ROE (12.103% vs. 13.579%; $t = 1.009$, $p = 0.316$). Panel regression results further showed that multinationality positively influenced ROA ($\beta = 1.820$, $p = 0.016$) and Tobin's Q ($\beta = 0.442$, $p = 0.004$), but had no significant effect on ROE ($\beta = 0.910$, $p = 0.492$). Control variables indicated that firm size and liquidity enhanced financial performance, whereas leverage had a negative effect across models. Post-estimation diagnostics confirmed model validity, with fixed effects appropriate for ROA and ROE, and random effects suitable for Tobin's Q. The study concluded that multinationality improves certain dimensions of financial performance, but internal structural factors remain critical. It was recommended that indigenous firms strengthen financial management and capital structures to improve their competitiveness in the industrial goods sector.

Keywords: Multinational firms, Indigenous firms, Industrial goods, Financial performance, Nigeria, Panel regression.

UNLOCKING THE POTENTIAL OF NANOTECHNOLOGY FOR ENVIRONMENTAL FORENSIC MAPPING: A SUSTAINABLE ENGINEERING PERSPECTIVE

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Abstract

Modern environmental engineering depends heavily on cutting-edge scientific methodologies for addressing issues of environmental contamination generated through industrial activity, urban development, and anthropogenic interventions. The use of traditional environmental forensic techniques faces numerous challenges in terms of detection sensitivity, spatial accuracy, and real-time monitoring. In this context, nanotechnology stands out as an effective and sustainable engineering technique that offers superior solutions to overcome these constraints by virtue of its inherent advantages.

In this study, we review the applications of nanotechnology in environmental forensics, with particular attention to how the latter can be used to detect and map the sources of pollutants, toxic substances, heavy metals, organic matter, and hazardous residues found in the air, water, and soil environments. The key emphasis will be on environmental forensics involving nanomaterials, such as nanosensors, quantum dots, metallic nanoparticles, and carbon nanomaterials.

This work draws on current literature to provide an overview of major achievements, issues, and future directions for nanotechnology-based environmental forensics in order to emphasize its potential to revolutionize environmental engineering in relation to pollution detection and ecological conservation.

Keywords: Nanotechnology, Environmental engineering, Environmental forensics, Nano-sensors, Pollution mapping, Sustainable monitoring.

ANALYSIS OF METHODS FOR ASSESSING THE QUALITY OF CONSTRUCTION PRODUCTS

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Abstract

This study examines the existing methods used for assessing the quality of construction products in civil and industrial engineering. Particular attention is given to the challenges associated with integrating multiple quality indicators into a unified system suitable for optimization and decision-making. The analysis highlights the absence of a comprehensive classification of quality indicators and the need for further development of a standardized evaluation framework. The paper reviews both traditional and modern quality assessment methods, including direct measurement techniques, expert evaluation, and statistical approaches. It is emphasized that the continued reliance on outdated control methods limits the effectiveness of quality assurance processes. In contrast, the adoption of advanced monitoring tools and data-driven techniques can significantly improve the accuracy and reliability of quality assessment. The study also considers the role of continuous quality control during construction and the importance of timely defect detection and correction. Special attention is paid to construction processes that require long-term monitoring of parameters, as they have a significant impact on the final quality of the product. Based on the analysis, recommendations are proposed for improving the system of quality assessment in the construction sector, including the development of unified indicators, modernization of control methods, and refinement of regulatory standards.

KERALA AS A DIGITAL GATEWAY: EVALUATING THE ROLE OF SOUTHERN STATES IN INDIA'S ACT EAST POLICY FOR ASEAN E-GOVERNANCE COLLABORATION

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ABSTRACT

Background: India's Act East Policy (AEP) has expanded from strategic and economic domains to digital connectivity with ASEAN nations. While Northeast India dominates AEP discourse, the potential of technologically advanced Southern states like Kerala as digital knowledge partners remains unexplored. Despite India-ASEAN digital MoUs, cross-border e-governance collaboration faces challenges of digital asymmetry and exclusion in borderland regions.

Objective: This study evaluates Kerala's emerging role as a "digital gateway" in India's AEP, specifically examining its fintech, health-tech, and startup ecosystem linkages for ASEAN e-governance cooperation. The focus is on assessing how Kerala's high digital literacy and public digital infrastructure can address digital inclusion gaps in CLMV countries.

Methodology: A qualitative policy analysis of MEA and ASEAN-India digital frameworks (2020-2026) is combined with case studies of Kerala Startup Mission and K-FON collaborations with Myanmar and Vietnam. The Cross-Border E-Governance Maturity Model is applied to identify cooperation pathways.

Expected Findings: Preliminary analysis indicates that Kerala's UPI, telemedicine, and e-health models offer replicable solutions for CLMV nations. However, data sovereignty concerns and lack of institutional mechanisms limit Southern state participation in AEP digital initiatives.

Policy Implications: The study proposes a "Sub-National Digital Diplomacy" framework under AEP, positioning Kerala as a hub for ASEAN capacity-building in e-governance. Findings contribute to SDG 9.c on universal internet access and SDG 17.6 on South-South technology cooperation.

Keywords: Act East Policy, Kerala Model, E-Governance, ASEAN-India, Digital Diplomacy, Sub-National Diplomacy, CLMV Countries, SDG 9

HYDROGEOLOGICAL RESEARCH OF GROUNDWATER THROUGH INTEGRATED GEOPHYSICAL METHODS (ERT AND VES) IN THE WHITE DRIN BASIN, KOSOVO

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Abstract

Sustainable management of groundwater resources requires accurate hydrogeological characterization and identification of aquifer structures in the groundwater. This study presents the integrated application of two geophysical methods – Electrical Resistivity Tomography (ERT) and Vertical Electrical Sounding (VES) – for the identification and characterization of aquifers in the Drin i Bardhë River Basin in Kosovo.

The research was conducted at 11 hydrogeological sites, including alluvial sediment environments, pro alluvial deposits and flysch formations. A total of 37.49 km of ERT profiles and 126 VES measurements were conducted, using the ARES and ARES II geophysical systems. Data analysis showed significant variations in electrical resistivity, with values $<30\text{--}50\ \Omega\text{m}$ representing water-saturated clayey sediments, while the range $80\text{--}200\ \Omega\text{m}$ identifies sandy and gravelly aquifers with high permeability.

The results show that about 63% of the studied localities present high aquifer potential, while 27% present medium potential, mainly in areas with conglomerates and heterogeneous deposits. Only 10% of the localities resulted unproductive, due to the presence of shallow bedrock or flysch formations with low permeability. The thickness of the identified aquifers varies from 15 to 40 m, while in some sedimentary areas it reaches up to 60–70 m depth.

The integration of ERT and VES methods enabled the identification of buried fluvial structures (paleo-channels) and the determination of optimal areas for monitoring drilling. Based on the geophysical interpretation, 14 locations for monitoring wells were proposed, significantly reducing the risk of unproductive drilling.

The results demonstrate that the integrated use of geoelectrical methods constitutes a reliable and cost-effective approach for the hydrogeological characterization of sedimentary basins and for sustainable groundwater resource planning in regions with high geological complexity.

Keywords: Groundwater; Electrical resistivity tomography (ERT); Vertical electrical sounding (VES); Hydro geophysics; Aquifer characterization; White Drini Basin; Kosovo.

TRADITIONAL CONFLICT MANAGEMENT STRATEGIES AMONG THE IGBOS IN NIGERIA: A CASE FOR INDIGENOUS SOCIAL WORK KNOWLEDGE IN NIGERIA

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Abstract

Conflict is an integral and inevitable aspect of human society. In Nigeria, modern ways of managing conflict such as the police, the military, judicial panel and law courts have not yielded desired results as they remain coercive and dismissive of local concerns. This study examined traditional conflict management strategies among the Igbos in Nigeria with a view on how it can promote indigenous social work knowledge in conflict management. The study employed qualitative research method. Data was sourced qualitatively through focus group discussions and in-depth interviews. Data analysis was done thematically relying on relevant qualitative analytical tools. Findings from the study revealed that the various traditional institutions for managing conflict among the Igbos include: the family, council of elders, age grade, village/town tribunals, masquerade cult, local deities and oracles. Through these traditional institutions, conflicts are managed through mediation, oath taking, covenant, adjudication, reconciliation, cross examination, negotiation, sanction and divination with emphasis on internalized values of honesty, openness, empathy, community solidarity, individual loyalty to the group, social cohesion and restoration of relationship. This study therefore recommends that social workers should suggest the need to incorporate indigenous knowledge in conflict management in order to achieve culture competent practice that addresses the peculiarity of peoples' problems.

Keywords: Traditional Conflict management strategies, Conflict, Culture competent practice, Indigenous knowledge, Social work, Nigeria.

QUANTITATIVE ASSESSMENT OF GEODIVERSITY IN THE CENTRAL HIGH ATLAS

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Abstract

Geodiversity is a recent concept, considered as the abiotic range of nature. It is defined as all geological (rocks, minerals, fossils), geomorphological (landforms, processes) and soil features, including their assemblages, relationships, properties, interpretations and systems.

In 2024, geodiversity cannot be said to be a new term or concept. However, it has not yet achieved the same degree of recognition as its biological counterpart, biodiversity. The term 'geodiversity' was first introduced in the early 1990s, with the aim of understanding, describing and conserving natural heritage through the assessment of geological (minerals, geological formations and rocks), geomorphological (hydrography and altitudes) and soil aspects.

In general, Morocco is widely appreciated for its geological, geomorphological and soil diversity. The central High Atlas, in particular, harbours exceptional geodiversity. It is home to a rich geological and geomorphological heritage, as well as a wide variety of remarkable landscapes.

In this work, a method of quantitative evaluation of geodiversity was applied to the central High Atlas. It is based on the quantification and integration of abiotic characteristics, represented on thematic maps, and on geodiversity parameters, superimposed on a systematic grid of 20 km².

Pour calculer l'indice final de géodiversité, on utilise les indices partiels, notamment ceux de la géologie (formation géologiques, roches), de l'hydrographie, de l'hypsométrie, des sols, et des minéraux.

The final geodiversity index takes the form of a geodiversity map, with five classes: very low, low, medium, high and very high. This map can be used as a land-use planning tool, in particular to identify priority areas for the conservation, management and use of natural resources in the region studied.

Keywords: Geodiversity; Central High Atlas; Morocco, Evaluation; Mapping

NATURAL COLORANT FROM FUNGAI FOR SUSTAINABLE TEXTILE

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Abstract

The rapid escalation in demand for sustainable and eco-friendly bio-colorants as alternatives to synthetic dyes has intensified scientific interest in fungal-derived pigments for textile applications. Fungi are prolific producers of a diverse array of bioactive pigments, including carotenoids, melanins, polyketides, and azaphilones, which exhibit a broad spectrum of colors. These fungal colorants are renewable, biodegradable, and capable of producing vibrant and stable shades on both natural and synthetic fabrics. Among natural sources, fungal-based colorants offer significant advantages, including low environmental impact, non-toxicity, and the ability to be produced under controlled fermentation conditions. Advances in fungal cultivation, pigment extraction techniques, and dyeing processes have enhanced color yield, fastness, and stability, positioning them as promising green alternatives to conventional dyes. Additionally, the production of fungal pigments can support the bio-economy through the utilization of agro-industrial waste as substrates. Recent biotechnological innovations have further enabled the exploration of multifunctional properties of fungal pigments, such as antioxidant, antimicrobial, and UV-protective activities, adding value to textile products. Despite challenges related to large-scale production, consistency, and stability, ongoing research is paving the way for their commercial adoption. This presentation will highlight various fungal sources of natural colorants, their extraction methods, and their applications in the textile industry and beyond.

Keywords; Fungal-colorants, sustainability, textile industry, natural dyeing, and bio economy.

GEOMETRIC OPTIMIZATION OF VORTEX CHAMBERS FOR LOW-HEAD HYDRO

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Abstract

This article focuses on the fluid dynamics of the "stator" (the tank) and how variations in the discharge diameter—much like your 14%, 16%, and 18% study—directly alter the air-core stability. The research establishes that the performance of a GVT is not merely a function of water volume, but of the Vortex Strength, which is highly sensitive to the outlet-to-tank diameter ratio (d/D).

The study highlights that if the outlet hole is too small (low ratio), the water accumulates in the tank, increasing the pressure at the bottom but "choking" the tangential velocity. Conversely, as the ratio increases toward the 18%–20% range, the air core becomes more defined and reaches deeper into the tank. This air core acts as a physical boundary that forces the water into a thin, high-velocity sheet along the tank wall. The article concludes that the "sweet spot" for maximum kinetic energy occurs when the air core diameter is approximately equal to the rotor's inner diameter. For your H-Darrieus rotor, this explains why the 18% ratio performed best: it likely created an air core that perfectly "pushed" the water into the path of your vertical blades. If the ratio is too low, the water becomes stagnant; if it is too high, the water exits too quickly without enough residence time to transfer its momentum to the blades. Therefore, the tank geometry serves as a "velocity nozzle" that must be tuned to the specific diameter of the rotor used.

GAS SEEPAGE INVESTIGATION ON THE BLACK SEA SHELF IN THE BATUMI AQUATORY

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Abstract

In 1993–94, a geochemical investigation of the territorial waters of Georgia, from the city of Poti to the Turkish border, was carried out jointly with Ukrainian colleagues. The research vessel of the Institute of the Southern Seas of the Ukrainian Academy of Sciences, equipped with the latest technology available at that time, utilized a hydroacoustic gas-surveying method, which proved to be highly effective for the detection and investigation of underwater gas-bearing fields. Moreover, the time required for gas surveying was significantly reduced, allowing us to obtain additional information essential for the comprehensive study of the Black Sea shelf.

During the expeditions, a gas-survey map was compiled, which enabled us to assess the condition of the seabed. Seismoacoustic sounding was also conducted, along with a comparison between areas where gas bubbles were observed and areas without gas emissions. The difference proved to be significant. The study demonstrated that locations of gas seepage in seas and oceans require particularly detailed investigation.

Keywords: gas seepage, fault line, sea shelf, seismic activity.

ANTIBIOTIC SUSCEPTIBILITY PATTERNS OF VIBRIO SPECIES ISOLATED FROM SELECTED SWIMMING POOLS IN IBADAN, NIGERIA

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Abstract

Recreational water environment, such as swimming pools, can become hidden hotspot for the transmission of pathogenic and antibiotic-resistant bacteria including *Vibrio* species which are found in water. The presence of resistant pathogens can constitute public health challenge; however, little is known about the resistance patterns of *Vibrio* species isolated from recreational water in Nigeria. Therefore, this study was carried out to determine antibiotic susceptibility profiles and detect resistance genes in *Vibrio* species isolated from selected swimming pools in Ibadan, Nigeria. Water samples were collected from five swimming pools, the total bacterial count was determined and *Vibrio* species were isolated using CHROMagar and were identified using standard microbiological methods. Antibiotic susceptibility testing was done using the Kirby-Bauer disk diffusion method against amoxicillin clavulanate, cefotaxime, cefuroxime, imipenem, gentamycin, ofloxacin, levofloxacin, trimethoprim-sulfamethoxazole, and chloramphenicol. Selected multidrug resistance isolates would subject to chlorine tolerance test.

The total bacterial counts obtained ranged from 1.32×10^2 to 2.14×10^2 CFU/mL and a total of 81 *Vibrio* species were isolated and identified. The isolates belonged to five species. The predominant species was *Vibrio cholerae* (43.0%), followed by *Vibrio alginolyticus* (22.0%), *Vibrio vulnificus* (16.0%), *Vibrio fluvialis* (12.0%) and *Vibrio parahaemolysis* (6.0%). The isolates exhibited high resistance to cefotaxime (98%), while moderate resistance was recorded for chloramphenicol (9%), and high susceptibility to levofloxacin (91%). Multidrug-resistance was observed in 30.9% of isolates.

These findings indicate that *Vibrio* species isolated from swimming pools in Ibadan exhibit notable antibiotic resistance, including multidrug resistance. This underscores the need for routine molecular monitoring, improved disinfection management and targeted public health interventions to reduce the risk of transmission of resistant bacteria via swimming pools.

Keywords: *Vibrio* species, antibiotic resistance, resistance genes, multidrug resistance.

SMART CITY PERFORMANCE OF THE CENTRAL-EASTERN-EUROPEAN CAPITALS

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Abstract

The urban population is growing steadily today, and smart cities are playing an increasingly important role across all continents. More international organizations and institutions are supporting the development of smart cities, and an increasing number of recommendations are being made for measuring their effectiveness. This study examines the capitals of the Central and Eastern European region in terms of their smart performance and ranks them accordingly. The assessment is conducted using a comprehensive smart city index, in line with the recommendations and pillars outlined in the international literature. The index evaluates the cities' performance across six components and identifies differences among them. In my case, the Central and Eastern European region under study consists of the four Visegrád countries, the three Baltic states, as well as Romania and Bulgaria. The results suggest that there are disparities in urban indicators even within the region; similar to the European average, northern-southern and western-eastern differences can be observed. The greatest disparities are found in the economic and environmental pillars, while the smallest are identified in the people pillar. In the governance, mobility, and quality of life pillars, the disparities are less pronounced.

Keywords: smart city, Central-Eastern-Europe, measurement, performance.

SEISMIC RETROFITTING OF REINFORCED CONCRETE COLUMNS USING RECYCLED PLASTIC FIBERS AND LRS-FRP SYSTEMS

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Supervisor Professor **Gina Gureshidze**

Supervisor Associate Professor Dr. **Muhammet Zeki Ozyurt**

ABSTRACT

The increasing accumulation of plastic waste and the seismic vulnerability of reinforced concrete (RC) structures represent two critical global challenges. This study presents an innovative and sustainable approach that integrates recycled plastic materials into concrete and applies advanced fiber-reinforced polymer (FRP) systems for seismic strengthening of RC columns.

In this research, polyethylene terephthalate (PET), high-density polyethylene (HDPE), and low-density polyethylene (LDPE) are used as partial replacements for fine aggregates in concrete at replacement ratios of 10%, 20%, and 30%. A comprehensive experimental program is conducted to evaluate the mechanical performance of plastic-modified concrete, including compressive strength, splitting tensile strength, and flexural strength. Additionally, reinforced concrete column specimens are externally strengthened using both conventional carbon fiber-reinforced polymer (CFRP) and large rupture strain FRP (LRS-FRP), particularly PET-based FRP systems.

The seismic behavior of the strengthened columns is assessed under cyclic lateral loading conditions. Key performance indicators include load-carrying capacity, displacement ductility, stiffness degradation, and energy dissipation capacity. The results indicate that recycled plastic fibers can improve ductility and reduce the density of concrete while contributing to environmental sustainability.

Furthermore, LRS-FRP systems demonstrate enhanced deformation capacity and improved confinement performance compared to conventional FRP systems, reducing the risk of brittle failure. This study contributes to the development of cost-effective, sustainable, and resilient seismic retrofitting techniques for reinforced concrete structures.

Keywords: Recycled plastic, FRP, seismic retrofitting, reinforced concrete, sustainability, LRS-FRP systems.

HYDRODYNAMIC MISMATCH: LIFT-BASED ROTORS IN CURVILINEAR FLOWS

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Abstract

This article addresses the specific challenge of using "Lift-Type" turbines, such as the H-Darrieus, in a vortex environment. While the H-Darrieus is exceptionally efficient in linear flows (like wind or open river currents), the article argues that it suffers from a significant "Curvature Effect" when placed inside a GVT. In a standard linear flow, the velocity vector hitting the blade is uniform. However, in a vortex, the fluid follows a spiral path where the velocity at the leading edge of a blade is significantly different from the velocity at the trailing edge.

The research explains that because the H-Darrieus operates on lift, it requires a stable Angle of Attack (AoA). In a vortex, the rapid change in fluid direction causes the blade to "stall" constantly as it rotates. This is why your study observed that the blades were "completely submerged" yet unable to capture the maximum energy. The article suggests that for a GVT, a Drag-Based or Hybrid rotor (combining Savonius and Darrieus features) is superior. A drag-based blade acts like a sail, catching the high-momentum water regardless of the turbulence or curvature of the flow. The article concludes that unless an H-Darrieus rotor is equipped with a "variable pitch" system to constantly adjust its angle to the spiral streamlines, it will always leave a significant amount of kinetic energy unharvested at the exit. This reinforces your conclusion that the H-Darrieus is not the "optimal design" for this specific application, but rather a starting point for hybrid optimization.

THE FORMATION OF THE PERSONALITY OF GENERAL V. ZALUZHNYI IN THE CONTEXT OF THE HISTORICAL EPOCH

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Abstract

Important for the formation of each individual is the historical epoch in which he is born, in which his formation takes place and on which his life path falls. General V. Zaluzhnyi represents the example of the formation of a strong personality in the conditions of social transformations. The formation of the personality of the future general V. Zaluzhnyi fell on the epoch which is called the "Brezhnevskiy stagnation" (70s of the 20th century). L. Brezhnev's "Golden Age" was marked by declarative reports about economic success and the growing well-being of Soviet citizens and the everyday realities of ordinary citizens when the growth of crisis phenomena in the life of the Soviet economy had a negative impact on the standard of living of Soviet citizens and was marked by a fall in the purchasing power of the karbovanets; rising prices, a shortage (deficit) of industrial goods and high-quality services when queues for prestigious imported goods were no longer hours but days; when retail prices for both prestigious goods (jewelry, crystal and carpets) and goods in wide demand: furniture, fur products, wool, petrol, building materials, citrus fruits, and communal services increased significantly; when there were ten-year queues to get apartments, queues to buy cars, overgrown with long-leaved grass; when corruption increased; when about 2/3 of the scientific potential of the USSR worked for the military-industrial complex (MIC). However, as before, no one could go abroad. Ideological views were strictly controlled and imposed on society, culture and art had to be created in accordance with the directives of the Central Committee of the CPSU. Such disparity influenced the formation of consciousness - the establishment of double morality, disbelief in ideological slogans and distrust of the ruling elite, when the thesis "they steal and give to us" became the dominant assessment of the government among the population.

So, the epoch of the late Soviet period with its dual morality influenced the formation of the future general V. Zaluzhnyi's critical attitude to the Soviet reality and acceptance of the changes that brought the declaration of Ukraine's independence.

Key words: historical epoch, "Brezhnev stagnation", General Valerii Zaluzhnyi

TWO-DIMENSIONAL NUMERICAL MODELING OF DEBRIS FLOW HAZARD ZONES IN THE COMPLEX TERRAIN OF THE SOUTH CAUCASUS: A CASE STUDY OF THE AMBROLAURI MUNICIPALITY (GEORGIA)

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Abstract

The mountainous regions of the South Caucasus are characterized by a high susceptibility to exogenous geological processes. The Ambrolauri Municipality (Racha-Lechkhumi region), situated within the Rioni River basin, represents a high-risk debris flow zone due to its complex tectonic structure and steep slopes composed of easily erodible lithologies. This study utilizes a two-phase mathematical model developed by the authors to evaluate debris flow hazard zones integrated with high-resolution Digital Elevation Models (DEM). In contrast to previously employed one-dimensional approaches, the proposed 2D model accounts for lateral spreading effects and the influence of pore pressure on run-out distance. Based on numerical experiments, depth and velocity maps were generated for a catastrophic scenario in a lateral gorge threatening the municipality's infrastructure. The results of this work can be utilized to update spatial planning strategies and inform the design of protective engineering structures.

Keywords: debris flow risk, 2D modeling, Ambrolauri, South Caucasus, Digital Elevation Model (DEM), hazard zoning.

ESSENTIAL COMPONENTS OF AN EFFECTIVE EVALUATION SYSTEM IN CHRISTIAN RELIGIOUS EDUCATION

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Abstract

Evaluation is a crucial component of the educational process, serving not only to measure learning outcomes but also to enhance the quality of instruction on an ongoing basis. In the context of Christian Religious Education (CRE), evaluation has a broader scope because learning objectives extend beyond cognitive achievement to include character formation, attitudes, and students' spiritual growth. Therefore, evaluation in CRE must be designed holistically in order to assess cognitive, affective, and spiritual domains in an integrated manner consistent with Christian faith values.

This study aims to examine the key components of an effective evaluation system in Christian Religious Education through a qualitative literature-based approach. The findings indicate that an effective CRE evaluation system requires clearly defined objectives and indicators, the use of valid and reliable assessment instruments, diverse evaluation techniques, and continuous implementation through formative and summative assessment. The role of the teacher as a professional and objective evaluator is identified as a critical factor, particularly in assessing affective and spiritual aspects of learning. Thus, evaluation in CRE should be understood as a systematic and continuous process that supports holistic student development, encompassing intellectual growth, character formation, and spiritual maturity.

Keywords: evaluation system, Christian Religious Education, holistic assessment, spiritual development

RESOURCE-EFFICIENT CONSTRUCTION: ECONOMIC BENEFITS AND STRATEGIES FOR REDUCING ENVIRONMENTAL IMPACT

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ABSTRACT

The modern construction sector faces increasing pressure to enhance economic efficiency while simultaneously reducing its environmental impact. Resource-efficient construction has emerged as a key approach that promotes the rational use of materials, energy, and water, as well as the minimization of waste throughout the entire lifecycle of a building.

This paper examines the fundamental principles of resource-efficient construction and evaluates their economic implications. Particular attention is given to material optimization, the use of environmentally friendly and recycled materials, and effective construction waste management practices. These approaches not only contribute to environmental protection but also lead to significant cost reductions during both construction and operational phases.

The study further analyzes the economic benefits associated with the implementation of resource-efficient technologies and management strategies, including improved energy performance, reduced operational costs, and enhanced long-term financial sustainability. Additionally, the integration of circular economy principles within the construction sector is discussed as a critical factor in achieving sustainable urban development.

The findings suggest that despite higher initial investment costs, resource-efficient construction provides substantial long-term economic advantages and increases project competitiveness. Therefore, it can be considered not only an environmental necessity but also an economically viable strategy for the development of a sustainable built environment.

Keywords: Resource-efficient construction; Sustainable development; Construction management; Economic efficiency; Environmental impact

APPLICATION OF THE NARANDIANI METHOD OF PILING IN LANDSLIDE-PRONE AREAS

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Abstract

Over the past decade, screw piling technology has been widely introduced in Georgia. A sheet pile is a steel structural element which, when driven into the ground, forms a continuous protective barrier (steel curtain) used in both temporary and permanent constructions. These elements provide high structural capacity while maintaining relatively low construction costs.

The system of interlocking sections enables their connection through clamps or embedding into the soil, thereby forming a continuous retaining wall. However, several limitations remain, including insufficient development of theoretical and experimental research and incomplete harmonization with international standards, which restricts the wider application and advancement of the technology.

Despite these limitations, Larsen sheet piles are extensively applied in retaining structures for excavations, riverbank protection, port and hydraulic engineering, road and bridge construction, and particularly in ensuring safe construction practices in historic and densely urbanized areas.

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COMPARATIVE ANALYSIS OF SEISMIC RESISTANCE AND STABILITY OF MULTI-STORY REINFORCED CONCRETE BUILDINGS CONSTRUCTED USING HEAVY AND LIGHTWEIGHT CONCRETE

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Abstract

This paper examines the methodology and calculation results for the construction of a 20-story reinforced concrete building designed in the city of Tbilisi. The study includes a dynamic analysis of the building under seismic and wind loads using the "LIRA SAPR 2024" software package. The primary goal of the work is to evaluate the impact of using heavy versus lightweight concrete on the load-bearing capacity and economic efficiency of the building. Results indicate that the use of lightweight concrete significantly reduces the building's self-weight, which is directly proportional to the reduction in seismic loads.

The seismic safety of multi-story buildings remains a critical challenge in urban development, particularly in seismically active regions like Tbilisi. This study aims to evaluate and compare the seismic resistance and structural stability of multi-story reinforced concrete buildings constructed using two different materials: heavy (normal-weight) concrete and lightweight concrete.

EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE PHYSICOCHEMICAL PROPERTIES OF A NOVEL STRONTIUM POLYPHOSPHATE, α -Sr(PO₃)₂

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Abstract

The α -Sr(PO₃)₂ was synthesized at 273.15 K and P = 1.01325 bar and characterized by single crystal X-ray diffraction analysis, IR & Raman spectroscopy, and Computational simulation (ELF, HSA & DFT) studies. This compound crystallizes in the centrosymmetric triclinic space group *P*-1 (*Z* = 4) with *a* = 5.7938(3) (Å), *b* = 7.2039(4) (Å), *c* = 8.0673(4) (Å), α = 97.800(2)°, β = 104.590 (2)°, γ = 106.647(2)° & *V* = 304.25(3) Å³. The 3D structure contains Sr(PO₃)₂ chains, which form wavy layers between which exist layers of (PO₃)⁻ ions. In addition, theoretical calculations were performed using the DFT/B3LYP/LanL2DZ basis set for crystal molecular structure, Infrared and Raman spectra, and HOMO-LUMO properties of the title compound. 3D-MEPs and the α -Sr(PO₃)₂-(HOMO/LUMO) were used to assess the total electron density (Global reactivity) and the reactive centres (Local reactivity). Molecular orbital contributions are evaluated by DOS. A comparative study by the SD is in the range DFT/XRD; 0.06 in % for bond lengths and 0.016 in % for angles. The Intermolecular α -Sr(PO₃)₂ interactions were quantified by HAS. The ELF identifies (non-binding and binding) regions of space that can be associated with electron pairs for elaborated material. The IR spectrum confirms the existence of the functional groups in the elaborated material. The complete vibrational assignments and analysis of the observed fundamental bands of the molecule were carried out.

Keywords: Strontium Polyphosphate; Crystal structure; X-ray; Computational (ELF, HSA, DFT) studies.

INVESTIGATION OF THE STABILITY OF SUBMERGED GEOTUBES UNDER WAVE ACTION ON SANDY COASTS

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Abstract

This study investigates the stability behavior of submerged geotubes employed as coastal protection structures under wave-induced hydrodynamic loading on sandy coasts. A comprehensive methodological framework is developed for evaluating the stability factor (SF) of geotubes by incorporating the combined effects of hydrodynamic drag, inertia, and lift forces generated by wave action. Particular attention is devoted to assessing the influence of geometric characteristics of geotubes, as well as hydrological and wave parameters, on the overall stability of the structure.

The analysis demonstrates that the stability of submerged geotubes is predominantly governed by incident wave height and the thickness of the water layer above the structure. Stability assessments were carried out for a range of geometric configurations and hydrodynamic conditions representative of sandy coastal environments. Based on the obtained results, stability regime maps were developed to identify optimal geometric dimensions and placement conditions for submerged geotubes during the preliminary design stage.

The findings indicate that, for safe and reliable performance under severe storm conditions, the design criterion $SF > 1.5$ must be satisfied. Furthermore, the selection of geotube diameter should be based on a detailed evaluation of wave-induced loading in order to minimize the risk of seabed sliding and structural instability. The proposed methodology and stability regime maps provide a practical engineering tool for the design and optimization of submerged geotube systems intended for coastal erosion protection on sandy shores.

Keywords: Geotube; Submerged breakwaters; Coastal erosion.

HOW ECOLOGICAL DESIGN AFFECTS PEOPLE'S BEHAVIOR IN PUBLIC SPACES

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Abstract

Modern urban environments become filled with a number of factors that constantly influence the mental state of a person. Such things as high traffic volume, noise, overstimulation by visuals, lack of contact with nature, and fast pace of urban life often result in psychological tiredness, decrease in attention span, increase in stress, and hyperactivity of the nervous system. It can be noted that in this situation, public spaces acquire a new meaning – it is no longer merely a part of the urban environment from the viewpoint of its function and beauty, but an environmental factor that can affect the emotional state and overall wellbeing.

The present study is intended to explore the impacts of ecological design in outdoor environments on human behavior and psychological response, specifically considering the ability of an effectively designed urban landscape to facilitate relaxation and restoration. This article aims to determine the influence of spatial layout, plant arrangement, shading, natural materials, terrain, and thermal comfort on mobility behavior, staying time, social interaction, and sense of safety. Ecological features such as tree canopy, planting buffer, porous paving, and quiet zones could decrease the negative effects of the environment by controlling thermal conditions, noise pollution, light pollution, and achieving sensory harmony, which could result in physiological deactivation and encourage leisurely behavior.

The paper suggests that environmentally aware planning for public spaces is an essential tool for urban resilience in terms of both ecological functionality and its ability to regulate sensory experience and psychological recovery as well as improve social relations between humans and their urban habitat.

THE PROBLEM OF MICROPLASTICS IN ENVIRONMENTAL MEDICINE

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Abstract

Introduction: Microplastics represent one of the most significant challenges in modern environmental medicine due to their widespread distribution and potential adverse effects on human health. These compounds enter the environment through various routes, including marine and freshwater sources, ambient air, and food products, increasing human exposure.

The study aimed to analyze the main sources, global distribution, and pathophysiological effects of microplastics on human health based on recent scientific literature.

Study Methods and Materials: This study is based on a narrative literature review conducted in accordance with PRISMA guidelines to ensure methodological transparency and accuracy. A comprehensive search was performed in the PubMed and Google Scholar databases, covering the period from 2014 to 2024. The following keywords were used: “microplastics,” “human health,” “bioaccumulation,” “microplastics ingestion,” and “toxicology of microplastics.”

Inclusion criteria were: Peer-reviewed studies focusing on the impact of microplastics on human health, Systematic reviews, meta-analyses, original research articles. After initial screening of **134 articles**, 37 met the final eligibility criteria and were analyzed in depth.

Literature management was conducted using **Zotero**, while Microsoft Excel was used for data synthesis and thematic organization.

Results: The findings indicate that microplastics have bio accumulative properties and are linked to serious health effects, including endocrine disruption, inflammation, immune dysfunction, cancer risk, and neurodegenerative diseases.

Conclusion: Strengthening control measures across drinking water, food, and air quality to mitigate microplastic exposure, supported by coordinated efforts in environmental regulation, public health, and education.

Key words: Microplastics, Health risks, Environmental medicine, Bioaccumulation.

BUILDING REHABILITATION AND RECONSTRUCTION IN COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

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Abstract

In the context of modern urbanization, building rehabilitation and reconstruction represent not only an economic but also an environmental challenge, where the construction sector is one of the major sources of energy consumption and environmental impact. This article reviews the importance of integrating environmental requirements into building rehabilitation and reconstruction processes, considering energy efficiency, life cycle assessment (LCA), and international regulations. The EU and Georgian legislative frameworks that define the sustainable transformation of buildings are discussed.

STRENGTHENING EVALUATION ACCOUNTABILITY IN CHRISTIAN RELIGIOUS EDUCATION: A SYNTHESIS OF RESPONSIVE AND GOAL-FREE EVALUATION BASED ON CHRISTIAN STEWARDSHIP

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Abstract

Accountable evaluation in education is a crucial issue in Christian Religious Education (CRE), which not only demands academic quality but also faithfulness to theological calling and spiritual responsibility. However, in practice, the evaluation of CRE programs often remains administrative and oriented toward compliance with standards, thus lacking integrity, critical reflection, and spiritual responsibility as part of the educational ministry. This study aims to reconstruct the concept of accountable evaluation in CRE through a synthesis of the responsive evaluation approach by Robert E. Stake and the goal-free evaluation approach by Michael Scriven, understood in light of the theological principle of 1 Corinthians 4:2 concerning faithfulness and integrity in Christian stewardship. This research employs a descriptive qualitative method with a literature review approach, examining evaluation theories, educational quality management practices, and theological reflections within the context of Christian Religious Education. The data are analyzed using thematic synthesis to identify conceptual linkages between evaluation approaches and Christian faith values. The findings show that responsive evaluation contributes to strengthening contextual, relational, and participatory dimensions in CRE, while goal-free evaluation emphasizes the importance of objectivity, honesty, and openness to the actual impacts of the learning process and faith formation. The synthesis of these two approaches results in a holistic-accountable evaluation model, which includes contextual sensitivity, methodological integrity, and spiritual responsibility as an expression of Christian stewardship in fulfilling the educational vocation.

Keywords: Evaluation Accountability; Christian Religious Education; Responsive Evaluation; Goal-Free Evaluation; Christian Stewardship

ENVIRONMENTAL ENGINEERING AND MODERN ECO-URBANISM: TBILISI'S TRANSPORT ECOSYSTEM AND FUTURE PERSPECTIVES

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Abstract

The paper explores the integration of environmental engineering and modern eco-urbanism within the framework of Tbilisi's transport ecosystem. The study addresses the urgent ecological challenges faced by large metropolises, primarily driven by traffic congestion and excessive reliance on private automobiles.

The authors analyze a new urban development model based on the advancement of telecommunications and autonomous life-support systems. This technological shift allows for a significant reduction in vehicle dependency, thereby decreasing the carbon footprint and improving overall urban living standards.

Key strategic directions for Tbilisi's urban future discussed in the paper include:

- **Ecologization of Transport:** Shifting from car-centric planning to green mobility and pedestrian-friendly zones.
- **Engineering Solutions:** Integrating energy-efficient, autonomous infrastructure into the urban fabric to ensure sustainable resource management.
- **Socio-Cognitive Dimensions:** Transforming the city into a nature-integrated space that harmonizes modern civilization's benefits—such as high-intelligence work and global connectivity—with environmental integrity.

Ultimately, the health of Tbilisi's transport ecosystem can only be restored through a complex, eco-centric strategy that harmonizes environmental preservation with urban dynamics.

Keywords: Environmental engineering, eco-urbanism, Tbilisi transport ecosystem, urban mobility, car dependency, sustainable planning, autonomous systems, telecommunications.

THE PROBLEM OF REUSING DECOMMISSIONED WIND TURBINE BLADES - PERSPECTIVES FOR APPLICATIONS IN CIVIL ENGINEERING

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Abstract

The need to search for alternative energy sources has led to a very rapid growth in wind energy technology over the last 20 years, which has led to a problem related to the rapid growth in the amount of non-biodegradable, thermosetting fiber reinforced polymer (FRP) composite materials, which are mainly used to produce wind turbine blades. The problem of effective reuse of material from decommissioned wind turbine blades currently poses significant challenges in the face of the huge amount of composite materials that are difficult to dispose of due to their strength and chemical properties.

This paper presents proposals for reusing wind turbine blade components as civil engineering structures. Examples include small-scale architectural elements, as well as structural elements such as retaining walls, acoustic screens, and foundation elements. The presented application proposals are the result of work within the Polytechnic Network VIA CARPATIA project, named after "President of the Republic of Poland Lech Kaczyński," financed by a special grant from the Minister of Education and Science.

A concept of reusing wind turbine blade structural elements as structural stabilizing elements of excavations and slopes was proposed. The possibility of using fragments obtained from two types of popular blade structures, i.e. Vestas and LM-type, was analyzed. It was assumed that the retaining wall structure would consist of vertical elements (columns) made of Vestas-type closed profiles filled with concrete and horizontal elements (slabs) of fragments extracted from LM-type blades.

EVALUATING THE IMPORTANCE OF EXPERIMENTAL DESIGN FOR EFFICIENT LABORATORY DATA COLLECTION

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Abstract

Experimental design is a fundamental step in scientific research that directly influences the quality and reliability of laboratory data. Well-planned experiments help ensure that data is collected efficiently, with minimal waste of time, resources, and effort, while still producing meaningful and interpretable results. This study highlights the importance of proper experimental planning in achieving high-quality laboratory outcomes. It emphasizes how structured selection of variables, controlled conditions, and systematic testing can improve the clarity and usefulness of results. Poor experimental design often leads to inconsistent findings, repeated trials, and increased experimental cost, whereas a well-organized approach enhances accuracy and reduces unnecessary repetition. Through general laboratory-based examples, the study illustrates how thoughtful design improves data consistency and supports better decision-making in research. Overall, it shows that effective experimental design is not only a technical requirement but also a practical necessity for generating efficient and reliable laboratory data.

Keywords: Experimental Design; Laboratory Data; Data Efficiency; Research Methodology

IMPROVEMENT OF COWPEA (*Vigna unguiculata*) GERMINATION AND GROWTH UNDER SALT STRESS BY CALCIUM TREATMENT

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Abstract

The aim of this study is to investigate the effect of NaCl alone and NaCl with a calcium supplement (CaCl_2) on the germination and early growth of *Vigna unguiculata* subjected to salt stress. Seeds from two populations, TZ2 and A11, originating respectively from Kabylie (Tizi Ouzou) and the Sahara (Adrar), were germinated in petri dishes at different NaCl concentrations (T0: distilled water: control; T1: 85 mmol. L⁻¹ NaCl, T2: 170 mmol.L⁻¹ NaCl; T3: 85 mmol.L⁻¹+ 10 mmol.L⁻¹ CaCl_2 , T4: 170 mmol.L⁻¹ NaCl+ 10 mmol.L⁻¹ CaCl_2) for 07 days. The results obtained show that salinity above 170 mM reduces the germination speed, the evolution of the germination percentage and the final germination percentage. In addition, salinity affected all the early growth parameters (radicle length, hypocotyl length, total length) and the vigour index of the seedlings. The A11 landraces is more tolerant than the TZ2. Calcium supplementation significantly improved the salt tolerance of both populations by attenuating the negative effects of NaCl on the parameters studied. Seeds supplemented with CaCl_2 had more rapid and synchronised germination and emergence, higher final germination percentages and a significant improvement in all growth parameters compared with seeds subjected to salt stress. The beneficial effect of Ca^{++} was more pronounced in the A11 population. Our results suggest that Ca^{++} supplementation can be a very effective method for improving cowpea productivity under unfavourable saline conditions.

Keywords: *Vigna unguiculata*, salinity, germination, growth, calcium supplement.

ARCHITECTURAL SIGNIFICANCE AND SUSTAINABLE DESIGN OF HISTORICAL HOLY PLACES IN NAJAF AND TBILISI

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Abstract

This paper presents a comparative architectural and environmental analysis of historical holy places in Najaf, Iraq, and Tbilisi, Georgia, examining how sacred complexes and their surrounding urban fabrics embody sustainable design principles relevant to contemporary eco-urbanism. The study addresses themes central to environmental engineering, construction technology, and urban ecology by investigating heritage-based environmental strategies embedded in sacred architecture across two climatically and culturally distinct cities. The paper builds on an earlier framework developed around the Shrine of Imam 'Alī in Najaf, which documented passive design principles, including courtyard sequencing, thermal-mass envelopes, shaded iwans, and guided ventilation, and extends this comparative lens toward Tbilisi as a historically layered pilgrimage and heritage environment. Both cities are interpreted through four shared analytical lenses: climate-responsive materiality, transitional spatial sequencing, courtyard and forecourt microclimates, and the relationship between sacred architecture and walkable urban morphology. In Najaf, the Shrine of Imam 'Alī exemplifies a sophisticated synthesis of thick masonry, reflective surfaces, domed spaces, and passive ventilation strategies that effectively mitigate heat stress under severe desert climatic conditions. In Tbilisi, historic ecclesiastical precincts and the traditional urban fabric demonstrate thermal moderation through compact street sections, stone and brick massing, slope-adapted siting, and protected transitional spaces, collectively forming a heritage landscape well aligned with eco-urban discourse. Methodologically, the study employs comparative qualitative analysis combining architectural interpretation, urban-morphological reading, and sustainability-oriented heritage assessment. Both sacred environments are interpreted not merely as symbolic monuments but as integrated environmental systems offering transferable lessons for contemporary sustainable design practice.

Keywords: Najaf; Tbilisi; sacred architecture; sustainable design; heritage conservation; eco-urbanism; courtyard microclimate; passive environmental control

ENVIRONMENTAL ENGINEERING AND THE FORMATION OF GREEN ENTREPRENEURIAL THINKING AMONG YOUNG PEOPLE

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Abstract

The integration of environmental engineering and green entrepreneurship has become increasingly relevant in the modern world, as ecological challenges and economic development are closely interconnected and form a unified ecosystem. Environmental engineering is a branch of engineering focused on environmental protection and the sustainable use of natural resources through technical and practical solutions. Green entrepreneurship, in turn, refers to the establishment and management of businesses that prioritize ecological responsibility and sustainability.

Young people represent the main driving force behind future economic development and innovation. Raising environmental awareness among youth contributes to the development of environmentally responsible behavior, the generation of innovative and sustainable business ideas, and ultimately to the reduction of local and global environmental problems.

Modern studies emphasize that integrating sustainability into engineering and entrepreneurial education is essential for shaping a new generation of innovators. However, several challenges remain, including the insufficient integration of green topics into educational systems, limited financial resources, lack of practical experience among young people, and inadequate levels of environmental awareness.

Addressing these challenges requires a systematic approach. The education, support, and active involvement of young people are among the key factors determining the success of the future green economy. Environmental engineering and green entrepreneurial thinking represent important foundations for sustainable development. Their integration among youth contributes to the establishment of an environmentally responsible society, the development of an innovative economy, and the reduction of global environmental problems.

Keywords: Environmental engineering, Innovation, Social support, Entrepreneurial thinking, Environmental awareness.

SUSTAINABLE USE OF WASTE TIRES IN ROAD CONSTRUCTION: ENVIRONMENTAL AND ENGINEERING PERSPECTIVES

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ABSTRACT

The increasing accumulation of waste tires has become a significant global environmental challenge, driven by their low biodegradability and harmful ecological impacts. Waste tires may persist in the environment for decades, contributing to land occupation, toxic emissions during combustion, and microplastic pollution, which accounts for approximately 28% of global microplastic release. Improper disposal, including landfilling and open burning, poses serious risks to ecosystems and public health.

At the same time, the construction sector—particularly road engineering—offers promising solutions for sustainable waste tire management. The incorporation of recycled tire rubber, especially in the form of crumb rubber modified asphalt (CRMA), has demonstrated both environmental and engineering benefits. From an ecological perspective, this approach reduces landfill volumes, conserves natural resources, and lowers greenhouse gas emissions. From an engineering standpoint, rubberized asphalt improves pavement elasticity, resistance to cracking, durability under temperature fluctuations, and overall service life.

International experience highlights the effectiveness of this approach. In regions such as the United States and the European Union, where recycling rates exceed 70% and 90% respectively, waste tires are increasingly utilized in asphalt technologies, contributing to improved road performance and extended lifespan. Studies indicate that rubber-modified asphalt can extend pavement life by 30–50% while significantly reducing maintenance needs.

Despite these advantages, challenges remain, including economic costs, technological limitations, and uneven recycling rates in developing countries. Therefore, further research and policy support are required to promote innovative recycling technologies and expand their application in infrastructure development.

In conclusion, the use of waste tires in road construction represents a sustainable and efficient solution that simultaneously addresses environmental concerns and enhances engineering performance, contributing to the development of circular economy practices in the construction industry.

Keywords: waste tires, asphalt modification, sustainability, recycling, road engineering, environment

STRUCTURAL STABILITY OF MULTI-STORY BUILDINGS WITH CONSIDERATION OF CREEP DEFORMATIONS IN PRESTRESSED STRUCTURAL SYSTEMS

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Abstract

The structural stability of modern multi-story buildings depends on the accurate representation of material behaviors and the proper consideration of time-dependent effects. This study examines the influence of creep deformation on the stress–strain state of prestressed reinforced concrete structures, with particular emphasis on statically indeterminate systems. The design of such structures requires strict adherence to appropriate analytical models and assumptions, ensuring realistic simulation of both global structural response and the behaviors of individual elements under combined short-term and long-term loading conditions.

Special attention is given to the mechanical characteristics of concrete, including shrinkage, relaxation, and creep, which significantly affect structural performance over time. The use of prestressing in frame systems is highlighted as an advanced engineering solution that reduces

material consumption while improving durability and stiffness due to the minimization of cracking. However, the development of creep deformation under sustained loading leads to stress redistribution, particularly in systems that exhibit different static schemes during construction and service stages.

The variability of experimentally determined creep parameters also addressed, as deviations from standard values may critically influence structural safety and, in extreme cases, lead to a loss of stability. Furthermore, the behaviors of joints in precast frame systems are identified as a key factor, where concrete crushing, cracking, and the deformability of embedded elements contribute to nonlinear deformation effects. These factors collectively alter the overall stress–strain state of the structure. The study emphasizes the necessity of refining code-based assumptions for structures sensitive to time-dependent effects, ensuring more reliable and accurate design outcomes.

ON IMPROVING THE DRINKING WATER SUPPLY OF TBILISI

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Abstract

The article discusses one of the options for solving the problematic issue of drinking water supply in Tbilisi, which involves adding a new source to the existing supply network. The advantages of the proposed option compared to other possible options are analyzed. Other concomitant positive effects arising from the implementation of the proposed option and the benefits to be derived from them are discussed.

If the proposed option is implemented: Tbilisi's drinking water supply and drinking water quality will improve, a large amount of electricity will be generated, and it will become possible to use a larger volume of water for irrigation. A small amount of generated electricity will be able to cover the electricity costs required for the operation of transport tunnels.

Keywords: drinking water, water consumption, reservoir, hydroelectric power plant, kilowatt hour, megawatt, tunnel crossing, road tunnel.

THE INFLUENCE OF THE BOND BETWEEN ASPHALT CONCRETE LAYERS ON THE DEVELOPMENT OF DAMAGE IN THE LAYER

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Abstract

The paper presents how the bond between asphalt concrete layers affects pavement damage. One of the reasons for the occurrence of cracks in asphalt concrete pavements and their subsequent damage is the difference between the inertial and elastic properties of the adjacent layers of the pavement. When the bond strength between the upper and lower layers of asphalt concrete is high, then the stresses arising from the shear forces acting on the upper layer are better distributed to the lower layer of asphalt concrete, and the lower coarse-grained layer is more resistant to deformations than the upper one. Therefore, since the resistance to shear depends on both the bond strength and the angle of internal friction, it is necessary to select the optimal composition of the mixture.

Key words: Grip strength, internal crotch angle, optimal.

PERFORMANCE EVALUATION OF A LABORATORY-SCALE MICROFILTRATION MEMBRANE IN THE TREATMENT OF POULTRY SLAUGHTERHOUSE EFFLUENTS

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Abstract

The increasing scarcity of freshwater has become one of the main environmental and socioeconomic challenges of the 21st century, involving not only quantitative availability but also water quality and the efficiency of resource management in the face of growing demand. In this context, this study aimed to evaluate the most appropriate operating pressure to optimize the efficiency of the microfiltration process in the treatment of poultry slaughterhouse wastewater, targeting its reuse. To assess process performance, permeate flux measurements were carried out at two operating pressures (0.5 and 1.0 bar), comparing results obtained with deionized water and wastewater. In addition, physicochemical and microbiological analyses were conducted to characterize the samples before and after treatment. The results indicated that, at an operating pressure of 0.5 bar, complete turbidity removal was achieved, along with reductions of 27% in chlorides, 20% in hardness, and 6% in alkalinity. Microbiological potability standards were also met. However, an approximate 7% reduction in flux was observed, indicating a potential lower operational limit. Therefore, it can be concluded that although microfiltration demonstrates significant efficiency in improving water quality, it is not sufficient on its own to fully meet the standards required for reuse. Thus, the application of complementary treatment steps is necessary, such as ultrafiltration and/or reverse osmosis membrane processes, as well as advanced oxidation processes, in order to ensure the final suitability of the treated water for reuse.

Keywords: microfiltration, wastewater treatment, poultry slaughterhouse, water reuse.

OPTIMIZATION OF NATURAL RED DYE EXTRACTION FROM MADDER USING RESPONSE SURFACE METHODOLOGY

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Abstract

Alizarin and purpurin are the main chromophores found in madder. The red madder dye extraction yield (Rmt%) was optimised using a central composite design (CCD) that considered three key parameters: acid concentration, alkali concentration and extraction time. The selection of the solvent, acid and alkali was first established through a preliminary screening study. CCD combined with response surface methodology (RSM) was then applied to identify the optimal operating conditions for maximising the extraction yield. The CCD experimental results indicated that the maximum extraction yield (91.8%) was achieved under the following conditions: 2.95% HCl, 2.95% NaOH and an extraction time of 1.25 hours. Furthermore, the developed statistical model demonstrated strong agreement between the predicted and experimental values, confirming its validity and robustness. The results also revealed significant interactions between the studied parameters, particularly between the concentrations of the acid and alkali, which play a crucial role in improving extraction efficiency. This optimised approach provides a reliable, scalable method for enhancing natural dye recovery.

Keywords: Rubiaticinctum L, Extraction, Factorial design, Central composite, Design.

URBANIZATION, NATURAL RESOURCES AND ECORECROSYSTEMS

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Abstract

Modern scientific and technical progress, with its accompanying results, has actively invaded the mechanism of self-regulation of natural-territorial complexes, which is a real damaging prerequisite for the process of transition from extensive to intensive use of nature. The article describes the current state of the ecorecosystem, which is deformed as a result of anthropogenic (including especially architectural-construction) and its products, structures of technogenic origin (industrial and other agglomerations, urbanized centers, cities, buildings and structures, etc.); The negative effects of rapid and uncontrolled urbanization on the historically formed urban landscape, which lead to social and spatial fragmentation and damage the quality of development of both the city and resort-recreational areas.

Keywords: ecorecosystems, biotop, recrotop, Emerald Network

THE URGENCY OF THEOLOGICAL FOUNDATIONS AND NATIONAL POLICY IN SPIRITUALITY ASSESSMENT IN CHRISTIAN RELIGIOUS EDUCATION IN INDONESIA

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ABSTRACT

Christian Religious Education (CRE) essentially aims to shape students who possess a mastery of Christian doctrine, growth in faith or spirituality, and the ability to practice faith in daily life. Therefore, CRE learning assessment should comprehensively cover the cognitive, affective or spiritual, and psychomotor domains. However, recent studies indicate that CRE teachers experience competency gaps in conducting assessments in the affective domain, particularly regarding faith and spirituality. The absence of national policy governing standards for the evaluation of faith and spirituality has resulted in assessment practices being carried out subjectively based on each teacher's individual creativity, making the validity and reliability of assessment outcomes difficult to justify academically and pedagogically. This study aims to analyze the need for a theological foundation for spirituality assessment, the urgency of national policy on faith evaluation standards, the recognition of affective assessment as a distinct domain in CRE, and the importance of training CRE teachers in spirituality assessment. The research method employed is a literature review with a qualitative-analytical approach to curriculum documents, educational policies, and recent research findings related to CRE assessment. The findings indicate that faith assessment requires a clear theological-pedagogical framework, normative national policy support, and the development of teacher competency through structured spiritual assessment training. This study concludes that without policy intervention and teacher capacity strengthening, the demands of holistic assessment in the Christian Religious Education curriculum risk becoming a pedagogical burden and creating disparities in the quality of Christian religious education at the national level.

Keywords: Christian Religious Education; Spirituality Assessment; National Education Policy

REDUCING FALSE ALARMS IN CONTINUOUS METHANE MONITORING AT OIL AND GAS FACILITIES USING A RECURRENT NEURAL NETWORK

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Abstract

This paper presents an artificial-intelligence-based approach for continuous methane monitoring at oil and gas facilities, with a focus on automatic leak detection under strong background variability and meteorological influence. The proposed framework combines gas-analytical and meteorological time series within a measurement-informed synthetic dataset constructed at a 10-minute resolution for baseline model development. A two-layer GRU-based recurrent neural network was used for rare-event recognition. Input sequences with a 6-hour temporal context were used to capture short-term concentration dynamics and meteorological variability. The final 6-hour configuration achieved a validation ROC-AUC of 0.78 using only observable gas-concentration, meteorological, and derived time-series features. Because direct threshold-based classification produced an excessive number of false positives, a threshold-calibrated post-processing procedure was introduced, including temporal aggregation and propane-based confirmation. Under the validation-stage baseline setting, the final system achieved recall of 0.83, precision of 0.76, F1-score of 0.79, and an average false-alarm rate of approximately 0.16 per day, correctly detecting 19 out of 23 leak events and producing six false alarms during the validation period. These results indicate that the proposed configuration is promising as a baseline solution for continuous preliminary screening and environmental monitoring support at industrial oil and gas sites.

Keywords: AI monitoring, methane leak detection, MRV systems, ESG reporting, recurrent neural networks, synthetic data.

SOCIAL MEDIA AND YOUTH MENTAL HEALTH: A CRITICAL ANALYSIS OF PSYCHOLOGICAL OUTCOMES

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ABSTRACT

The widespread use of social media has significantly reshaped the daily lives of young people, influencing how they communicate, form relationships, and perceive themselves. While these platforms provide opportunities for interaction, creativity, and access to information, concerns about their impact on youth mental health have increased in recent years. This study offers a critical analysis of the psychological outcomes associated with social media use among adolescents and young adults. The paper explores both the beneficial and harmful effects of social media engagement. On the positive side, social media can enhance social connectivity, provide emotional support, and create inclusive communities, particularly for individuals who may feel isolated in offline settings. It also allows users to express themselves and develop a sense of identity. However, growing evidence suggests that excessive or problematic use may contribute to negative psychological outcomes, including anxiety, depression, loneliness, reduced self-esteem, and dissatisfaction with body image. This study pays particular attention to key underlying mechanisms such as social comparison, cyberbullying, and the fear of missing out (FOMO), all of which may intensify emotional distress among young users. Additionally, algorithm-driven content exposure is discussed as a factor that can reinforce harmful patterns of thinking and behavior. The paper also considers moderating variables, including usage patterns, personality traits, gender differences, and cultural context, which influence how social media affects individuals. By reviewing current academic literature, this research highlights the complexity of the relationship between social media and mental health, emphasizing that its effects are not universally negative or positive. The study concludes by recommending the promotion of digital literacy, responsible usage habits, and supportive interventions from educators and policymakers to protect and improve the well-being of young people in the digital age.

Keywords: Social Media Engagement; Adolescent Well-being; Psychological Impact; Social Comparison; Digital Environment

DIFFERENTIAL EQUATIONS OF SNOW AVALANCHE MOTION AND CRITERIA FOR STABILITY AND INSTABILITY

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Abstract

In order to study the dynamic processes of snow avalanches, information regarding avalanche hazard conditions is presented.

A continuous deformable body model was taken as the primary physical-mechanical model for snow avalanches, which fully reveals the characteristics of plasticity and looseness. To describe the dynamic processes of avalanche-like flows, a two-dimensional system of equations for composite media (landslides and collapses) is used as the theoretical foundation. The equations consist of: the limit state equation for a loose medium, incorporating the internal friction angle (φ) and the cohesion coefficient (K) (the Coulomb-Tresca-Saint-Venant condition), defining the relationship between the tangential and normal stress components as well as the relationship between the stress tensor components, the internal friction angle, and the speed deformation tensor components.

Based on this system, a one-dimensional hydraulic-form equation system for snow avalanche dynamics has been derived. When the parameters of the granular loose medium are reduced to zero, this system automatically transforms into equations describing so-called plastic-viscous fluids, which are characteristic of “soft” snow avalanches. The system of one-dimensional hydraulic-form equations is written in an integral form adapted for snow avalanches.

Based on the calculated relationship between shearing and holding forces (the ratio of which determines the loss of snow cover stability), the simplest and generalized criterial conditions for the formation of snow cover and snow avalanches have been obtained resulting from the effects of filtration, seismic shocks, and backwinds on static stability and instability.

Keywords: Snow, avalanche, hydraulic, equation, criterial conditions.

USING TASK-BASED GRAMMAR TO ENHANCE ESP LEARNERS' WRITING SKILLS IN MANAGEMENT CLASSES OF LYCÉE TECHNIQUE ET PROFESSIONNEL OF PORTO-NOVO (BENIN)

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Abstract

This study investigates the impact of task-based grammar on learners' writing performance in management ESP classes in Lycée Technique Professionnel of Porto-Novo (LTP/P-N). The objective is to explore possibilities to provide an authentic learning environment where the target language is used to overcome real-life communication challenges in order to facilitate ESP learners' professional integration. A mixed-method has been used. The instruments include fifty (50) questionnaires addressed to learners and classroom observations held in eight (08) EFL classes. The results confirm that in most ESP classes, English is taught as a mere school subject in a non-conducive classroom atmosphere, frustrating for both learners and teachers. This study also evidences task-based grammar activities which significantly improve learners' writing skills and provide an authentic, motivating, flexible and relaxing learning experience in ESP context. The present study suggests ESP teaching courses should be integrated into Benin teachers training schools. Moreover, teachers should grab opportunities to take part in workshops and training related to innovative teaching-learning methods.

Keywords: Task-based grammar, ESP, accuracy, writing.

GREEN SETTLEMENTS IN THE DIGITAL WORLD

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Abstract

In the modern era, the acceleration of urbanization and digitalization processes has created new challenges in the urban environment. The fact that a large proportion of the world's population lives in cities leads to increased energy consumption, deepening environmental problems, and resource scarcity. In this context, the integration of the concepts of "green cities," "smart cities," and "smart villages" is of great importance.

Green settlements managed through digital technologies represent an innovative development model aimed at ensuring both ecological balance and social well-being.

The concept of a "smart and green city," as well as a "smart village," implies the integration of physical, economic, social, and environmental components. This approach requires that settlements be developed not only technologically but also in accordance with the principles of sustainable development.

The main characteristics of green settlements in the digital world include:

Energy efficiency – reducing energy consumption through smart buildings and sensor systems

Low carbon emissions – application of renewable energy sources

Green infrastructure – protection of parks, green spaces, and ecosystems

Smart transportation systems – reducing traffic congestion and air pollution

Resource management – efficient management of water and waste, as well as recycling

These components improve the quality of urban life and maintain ecological balance.

Technologies enable real-time monitoring of urban systems and enhance decision-making processes. At the same time, several challenges exist in the development of digital green cities:

high financial costs

unequal development of technological infrastructure

data security and ethical issues

social inequality

Green settlements in the digital world serve as an innovative response to modern urbanization problems. The application of digital technologies makes cities more efficient, environmentally friendly, and livable. However, alongside technological advancement, maintaining social and ecological balance remains a key priority.

Keywords: "smart city", "smart village", ecosystem

X-RAY RADIATION ATTENUATION PROPERTIES of BORON DOPED MEDIUM DENSITY FIBREBOARD and PARTICLEBOARD MATERIALS

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Abstract

This study provides a comprehensive investigation into the radiation attenuation properties of boron-doped medium-density fiberboard (MDF) and particleboard materials designed for protection against diagnostic X-rays. In the scope of the experimental procedure, composite panels were fabricated by incorporating boric acid and zinc borate at a concentration of 25wt%. The shielding performance of these specimens was evaluated under a 90 kVp tube voltage, a standard energy level frequently utilized in diagnostic radiology. To establish a comparative baseline, Radiation Attenuation Ratio (RAR) values were determined for both the boron-doped samples and the undoped reference MDF and particleboard materials. The experimental results revealed that the addition of boric acid did not yield a statistically significant improvement in radiation attenuation capability compared to the reference samples for both MDF and particleboard at the specified energy level. Conversely, MDF samples doped with zinc borate exhibited substantially higher radiation attenuation ratios than both the reference and boric acid-doped groups. A similar enhancing effect was observed in the particleboard counterparts, indicating that the chemical composition of the dopant plays a critical role in photon interaction. Furthermore, a comparative analysis of the substrate materials demonstrated that MDF consistently outperformed particleboard across all experimental groups in terms of attenuation efficiency. This superiority is attributed to the higher density and more homogeneous fiber distribution of MDF compared to the porous structure of particleboard. Consequently, the findings suggest that zinc borate-doped MDF serves as a more effective and viable alternative for structural radiation shielding in medical environments.

Keywords: Radiation attenuation, MDF, Particleboard, Boric acid, Zinc borate, Diagnostic X-rays.

EFFECTS OF AQUEOUS BULB AND RHIZOME EXTRACT ON FEATHER DEVELOPMENT OF BROILER CHICKENS

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ABSTRACT

Feather development in broiler chickens is pivotal for thermoregulation, protection, and overall welfare. Despite growing interest in phytogetic feed additives such as onion, garlic, and ginger, which are recognized for their antioxidant, anti-inflammatory, antimicrobial, and growth-promoting properties in broiler chickens, limited information exists regarding their influence on feather growth. This study evaluated the effects of an aqueous blend of these bulb and rhizome extracts, administered via drinking water, on feather length and number in broiler chickens. A total of 360 day-old broiler chicks were randomly assigned to four treatments in a completely randomized design, with six replicates of 15 birds each. Treatments consisted of 0 g/L (control), 20 g/L, 30 g/L, and 40 g/L of the aqueous blend per litre of drinking water (diluted at 1 mL blend per liter). The extract was supplied through drinking water at a rate of 1 ml per litre. Feather parameters were assessed weekly from week 1 to week 5. Results indicated no statistical differences ($p > 0.05$) among treatment groups for parameters measured. Feather length increased progressively in all groups over the experimental period, reflecting normal growth patterns. The highest (1.90) feather length at week 5 was observed in the 40 g/L treatment group, while the control recorded the lowest (1.56). same also applies to the feather width. The control was observed to have the least values for feather width (11.50), while Treatment 4, recorded the highest (12.82) value at week 5. These findings suggest that, the aqueous bulb and rhizome extract blend did not substantially modulate feather development in broiler chickens. Further research with varied concentrations, and extraction techniques may elucidate potential subtle benefits.

Keywords: Onion, Garlic, Ginger, Broiler chicken, and Feather growth.

TUSHETIES NATURAL RESOURCE DEVELOPMENT

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Abstract

Tusheti's natural resource potential is determined by its highly interesting geographical location and boundaries, complex mountainous relief and area, towering majestic mountains and snow-covered glacial peaks, access roads and trails, climatic and soil conditions, water-rich rivers and waterfalls, lakes, and protected areas.

Tusheti has a very mountainous surface, deeply dissected by gorges, where streams flowing down from high peaks join Tusheti's two water-rich rivers — the Gometzari Alazani and the Pirikita Alazani. Tusheti lies within the basins of these two Alazani rivers.

In Tusheti, two eras stand face to face: one is old, almost untouched and patriarchal, while the other is modern. At the meeting point of these sharply different eras, numerous issues emerge, including natural and climatic, tourism and recreational, economic, historical, socio-economic, socio-cultural, architectural, scientific, archaeological, flora and fauna conservation, management and use of natural resources and man-made wealth, migration and emigration of the population, development of traditional branches of the economy, and other types of problems.

The Government of Georgia has undertaken to resolve this issue at the state level, which is directly connected with the present and future development of Tusheti.

Key Words: Tusheti, Alazani river, tourism

ELECTRONIC MODEL OF MUNICIPAL SOLID WASTE CIRCULATION

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Abstract

The paper considers an electronic model of municipal solid waste circulation as a tool for improving the efficiency of waste management in the urban environment. The relevance of the topic is determined by the need to move from fragmented waste accounting to an integrated digital system that enables the tracking of municipal solid waste at all stages of its life cycle: from generation and collection to transportation, sorting, recycling, treatment, and final disposal.

The proposed model provides for the creation of a digital framework for waste circulation, including data on waste generation sources, waste volumes, morphological composition, collection and transportation routes, operators, sorting facilities, recycling enterprises, and final disposal sites. The use of such a model makes it possible to increase process transparency, reduce information losses between system participants, improve control over contractual and environmental obligations, and create a basis for analytics and forecasting.

Special attention is paid to the practical application of the electronic model for optimizing transportation routes, assessing infrastructure capacity, identifying problematic areas in the waste management system, and supporting management decision-making. The implementation of a digital approach can contribute to the development of sustainable urban infrastructure, increase the level of waste recycling, and reduce negative environmental impacts.

Thus, the electronic model of municipal solid waste circulation is considered a promising element of modern eco-urbanism and the digital transformation of municipal services.

Keywords: municipal solid waste; electronic model; digital accounting; waste management; eco-urbanism; sustainable management.

REVOLUTIONIZING REAL ESTATE THROUGH IMMERSIVE BUYING: VIRTUAL REALITY AS A VITAL ELEMENT FOR SUSTAINABLE ARCHITECTURE DESIGN SOLUTIONS OF HOUSING IN REAL ESTATE OF PAKISTAN.

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ABSTRACT

Human life has always been centered around one dwelling acting as a home to the social dynamics of a community life. With rise in urban influx and population in urban centers across the globe, the demand for the housing has increased with lack of prioritization on buyer level to make the design buyer focused which lead to lack of user satisfaction and poor design sustainable usage. Hence there was a need to deploy modern day technology like Virtual Reality (VR) to incorporate user participation and interaction at an early design development stage to evolve custom design solutions for enhanced positive real estate purchase decisions. The research aimed to address the gap through using VR at design stage to improve user interaction towards sustainable design development. Using VR models and cost effective youtube videos along with online and physical questionnaires, endusers were provided with VR experience towards choice and selection of dwelling and interior spaces. More than 165 respondents provided feedback and agreed the usage of VR as a facilitator in optimized real estate purchase decision making as well as opting for sustainable design solution development at an early stage. The results showed a positive impact on end user satisfaction and engagement. However challenges like VR modeling, costly equipment and sensitization of end users were faced as challenges to be delved into in future research.

Keywords: Sustainability, Housing & Architecture design, Virtual Reality, User Experience, Real Estate Purchase Decision.

GEOPOLITICAL SHIFTS IN EUROPEAN SECURITY: SPRING 2026

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Abstract

The Russian invasion of Ukraine represents a critical juncture in the evolution of European security and has significantly reshaped the European Union's foreign policy and defence cooperation agenda. This paper examines how the post-2022 security environment has accelerated the EU's geopolitical repositioning, exposed structural limitations in its foreign and security policy architecture, and prompted a reassessment of its engagement with neighbouring states, particularly those holding EU candidate status. By situating the invasion as a systemic shock to the European security order, the paper analyses the EU's emerging role as a geopolitical actor in an increasingly polarised international environment.

The paper focuses on three interrelated dimensions. First, it analyses the transformation of EU foreign and security policy in response to heightened military threats, with particular attention to defence cooperation, strategic autonomy, and crisis management capacities. Second, it examines the evolving European Neighbourhood Policy through the lens of enlargement and candidate status, focusing on Ukraine, Moldova, and Georgia as key case studies that illustrate both opportunities and tensions in the EU's neighbourhood engagement. Third, it explores the complementarity and rivalry between the EU and NATO, assessing how institutional overlap and strategic coordination shape Europe's collective response to security challenges.

Methodologically, the paper combines geopolitical analysis with comparative case studies to assess policy responses, regional dynamics, and institutional adaptation. It contributes to ongoing scholarly debates on EU actorness, security governance, and neighbourhood integration by highlighting how the war in Ukraine has redefined strategic priorities and recalibrated relations between the EU, its neighbours, and other polar powers.

Overall, the paper argues that the invasion of Ukraine has not only transformed the EU's external environment but has also catalysed a deeper reconfiguration of its foreign policy ambitions and defence cooperation frameworks, with long-term implications for European stability and regional integration.

AVRUPA GÜVENLİĞİNDE JEOPOLİTİK DEĞİŞİMLER: BAHAR 2026

Özet

Rusya'nın Ukrayna'yı işgali, Avrupa güvenliğinin evriminde kritik bir dönüm noktası oluşturmuş ve Avrupa Birliği'nin dış politikasını ve savunma işbirliği gündemini önemli ölçüde yeniden şekillendirmiştir. Bu araştırma, 2022 sonrası güvenlik ortamının AB'nin jeopolitik yeniden konumlanmasını nasıl hızlandırdığını, dış ve güvenlik politikası mimarisindeki yapısal sınırlamaları nasıl ortaya çıkardığını ve özellikle AB aday statüsüne sahip komşu devletlerle olan etkileşiminin yeniden değerlendirilmesine nasıl yol açtığını incelemektedir. İşgali Avrupa güvenlik düzenine sistemik bir şok olarak konumlandırarak, araştırma, giderek kutuplaşan uluslararası ortamda AB'nin jeopolitik bir aktör olarak ortaya çıkan rolünü analiz etmektedir.

Araştırma, birbiriyle ilişkili üç boyuta odaklanmaktadır. İlk olarak, özellikle savunma işbirliği, stratejik özerklik ve kriz yönetimi kapasitelerine dikkat ederek, artan askeri tehditlere yanıt olarak AB dış ve güvenlik politikasının dönüşümünü analiz etmektedir. İkinci olarak, AB'nin komşuluk ilişkilerindeki fırsatları ve gerilimleri gösteren temel örnek olay incelemeleri olarak Ukrayna, Moldova ve Gürcistan'a odaklanarak, genişleme ve aday ülke statüsü merceğinden Avrupa Komşuluk Politikasının evrimini inceliyor. Üçüncü olarak, AB ve NATO arasındaki tamamlayıcılığı ve rekabeti araştırarak, kurumsal örtüşme ve stratejik koordinasyonun Avrupa'nın güvenlik sorunlarına verdiği kolektif yanıtı nasıl şekillendirdiğini değerlendiriyor.

Metodolojik olarak, araştırma, politika yanıtlarını, bölgesel dinamikleri ve kurumsal adaptasyonu değerlendirmek için jeopolitik analizi karşılaştırmalı örnek olay incelemeleriyle birleştiriyor. Ukrayna'daki

savaşın stratejik öncelikleri nasıl yeniden tanımlandığını ve AB, komşuları ve diğer kutup güçleri arasındaki ilişkileri nasıl yeniden düzenlediğini vurgulayarak, AB aktörlüğü, güvenlik yönetişimi ve komşuluk entegrasyonu üzerine devam eden akademik tartışmalara katkıda bulunuyor.

Genel olarak, araştırma, Ukrayna'nın işgalinin yalnızca AB'nin dış ortamını dönüştürmekle kalmayıp, aynı zamanda Avrupa istikrarı ve bölgesel entegrasyon için uzun vadeli sonuçlar doğuracak şekilde, dış politika hedeflerinin ve savunma işbirliği çerçevelerinin daha derin bir yeniden yapılandırılmasını da tetiklediğini savunuyor.

RADIOLOGICAL RISK ASSESSMENT OF SOIL-TO-PLANT TRANSFER OF NATURAL AND ANTHROPOGENIC RADIONUCLIDES IN SEMI-ARID AGROECOSYSTEMS

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Abstract

The consumption of plants that accumulate natural or anthropogenic radionuclides constitutes the main pathway of internal exposure to ionising radiation. Consequently, a precise evaluation of radionuclide transfer from soil to plants is essential for assessing the radiological risks associated with food intake. In this study, various agricultural products—including vegetables (red and green peppers, long cucumbers, eggplant, and calabash), maize, legumes (beans), and cereals (barley and wheat)—along with their corresponding soil samples, were collected from a semi-arid region in Meknes, Morocco. Radionuclide activity concentrations were measured using high-purity germanium (HPGe) gamma- and alpha-spectrometry.

The results indicated that radionuclide activity levels in all soil samples were below global average values. In crops, ²¹⁰Po concentrations ranged from 0.12 to 0.54 Bq/kg, while ⁴⁰K levels ranged from 97.06 to 1181.07 Bq/kg. Other radionuclides (²³⁴Th, ²²⁶Ra, ²²⁸Th, ²²⁸Ra, ²¹⁰Pb, and ¹³⁷Cs) were below detection limits. These findings suggest either limited transfer of these radionuclides to edible plant parts or their absence at measurable levels in the studied crops. Soil-to-plant transfer factors ranged from 0.005 to 0.018 for ²¹⁰Po and from 0.74 to 8.29 for ⁴⁰K, while those for the remaining radionuclides were negligible.

Overall, this study provides site-specific transfer parameters for semi-arid agricultural systems and contributes valuable data to the radioecological database for Morocco.

Keywords: Radionuclides, soil, plants, gamma spectrometry, alpha spectrometry, transfer factors.

THE ROLE OF COMMERCIAL BANKS IN THE DEVELOPMENT OF THE GREEN ECONOMY IN THE KYRGYZ REPUBLIC.

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ABSTRACT

This article examines the role of commercial banks in promoting the development of the green economy in the Kyrgyz Republic. In the context of growing environmental challenges, climate-related risks and the increasing need for sustainable economic transformation, the banking sector is becoming an important institutional mechanism for supporting environmentally responsible development. Commercial banks can play a decisive role in mobilizing financial resources, directing capital toward green projects and encouraging enterprises to adopt cleaner, more efficient and resource-saving technologies.

The study is based on the analysis of statistical and analytical data obtained from the National Statistical Committee of the Kyrgyz Republic and the UNCTAD database. These information sources were used to assess the general economic environment, investment trends and the significance of sustainable finance for the country's long-term development. Particular attention is given to the capacity of commercial banks to support green economic initiatives through environmentally oriented lending, financing of renewable energy projects, support for energy efficiency measures and the promotion of sustainable business practices.

The article emphasizes that the participation of commercial banks in the development of the green economy goes beyond traditional financial intermediation. It also includes the integration of environmental considerations into credit policy, investment decision-making, and risk management systems. Green finance instruments can contribute to reducing ecological pressure, improving the quality of economic growth and strengthening the resilience of the national economy. At the same time, the research identifies several challenges, including limited experience in green banking practices, insufficient methodological support and the need for stronger institutional and regulatory frameworks.

It is concluded that the active involvement of commercial banks in green economic development can become an important factor in ensuring sustainable growth in Kyrgyzstan. Expanding green financial instruments, improving financial infrastructure and increasing cooperation between the banking sector and public institutions are essential for achieving this objective.

Keywords: green economy, commercial banks, sustainable finance, green lending, Kyrgyz Republic.

ENHANCING THE IMPLEMENTATION MECHANISMS OF TARGETED PROGRAMS FOR ATTRACTING FOREIGN INVESTMENT INTO THE REGIONS OF KYRGYZSTAN.

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ABSTRACT

This article examines the improvement of implementation mechanisms for targeted programs aimed at attracting foreign investment into the regions of Kyrgyzstan. In the context of regional economic disparities and the growing need for balanced territorial development, foreign investment is considered one of the most important instruments for stimulating production, modernizing infrastructure, creating jobs and increasing the competitiveness of regional economies. However, the effectiveness of targeted investment programs depends not only on their formal adoption, but also on the quality of their implementation mechanisms, institutional support and adaptability to regional conditions.

The study is based on the analysis of statistical and analytical data from the National Statistical Committee of the Kyrgyz Republic and the UNCTAD database. These information sources were used to assess the dynamics and territorial distribution of foreign investment, identify regional differences in investment attractiveness and evaluate the broader economic conditions influencing investment inflows. Particular attention is paid to the role of targeted programs as practical tools for directing foreign capital into priority sectors and less-developed regions of the country.

The article emphasizes that improving the implementation of such programs requires a comprehensive approach, including stronger coordination between central and local authorities, clearer project selection criteria, enhanced monitoring and evaluation systems and the development of region-specific investment incentives. It is argued that the effectiveness of targeted programs can be significantly increased through better institutional design, transparent governance, improved infrastructure and stronger partnerships between the public and private sectors. In addition, the promotion of regional investment potential should be supported by reliable information platforms, strategic planning and measures aimed at reducing administrative barriers.

The findings suggest that the modernization of implementation mechanisms for targeted investment programs can become an important factor in strengthening regional development and ensuring a more even distribution of foreign investment across Kyrgyzstan. This, in turn, can contribute to sustainable economic growth, higher regional resilience and deeper integration of the country's regions into national and international investment processes.

Keywords: foreign investment, targeted programs, regional development, investment policy, Kyrgyzstan.

ВОЗМОЖНОСТЬ ИСПОЛЬЗОВАНИЯ ОСАДКОВ СТОЧНЫХ ВОД ГАЛЬВАНИЧЕСКОГО ПРОИЗВОДСТВА В СТРОИТЕЛЬНОЙ ОТРАСЛИ

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Аннотация

В рамках договоров между Брестским инженерно-строительным институтом (БИСИ), ныне учреждение образования «Брестский государственный технический университет» (УО «БрГТУ»), Учреждение образования «Брестский государственный педагогический университет им. А.С. Пушкина» (УО «БрГПУ им. А.С. Пушкина»), Московским государственным проектным институтом (МГПИ) и Белорусским НИИ санитарии и гигиены Минздрава Беларуси на протяжении многих лет проводились исследования физико-химических свойств осадков сточных вод производств защитных покрытий (ПЗП) и печатных плат (ППП) предприятий г. Минска и г. Бреста. Они показали, что гальваношлам можно эффективно комплексно утилизировать в качестве компонента строительных материалов. При этом использование высушенного осадка сточных вод позволяет снизить температуру обжига изделий на 50 °С, что обеспечит экономию топливно-энергетических ресурсов, снизить выделения оксидов серы на 68-83 %, улучшив санитарно-гигиенические условия. При этом керамическая масса, изготовленная с добавками осадка сточных вод ПЗП и ППП способствует повышению прочности при сжатии на 1-2 марки, уменьшению водопоглощения и увеличению морозостойкости изделий в 1,5-2 раза, одновременно улучшению их внешнего вида и расширению цветовой гаммы. Помимо этого, добавление осадка сточных вод в сырьевые смеси для рядового кирпича, плитки керамической фасадной, гравия керамзитового, а также бетона легкого на пористых заполнителях в пределах: 5-15 мас %, обеспечивает в соответствии с заключением Белорусского НИИ санитарии и гигиены Минздрава Беларуси получение экологически безвредной продукции, полностью отвечающей требованиям её безопасной эксплуатации для здоровья человека и окружающей среды.

Ключевые слова: Осадок, песок, глина, керамзит, кирпич, керамика, глазурь, пластичность, дисперсность, прочность, термостойкость, морозостойкость, водопоглощение.

Abstract

Under agreements between the Brest Civil Engineering Institute (BISI), now Brest State Technical University (BSTU), Brest State Pedagogical University named after A.S. Pushkin (BSPU), Moscow State Design Institute (MSPI), and the Belarusian Research Institute of Sanitation and Hygiene of the Ministry of Health of Belarus, research has been conducted over many years into the physicochemical properties of wastewater sludge from protective coating (PPC) and printed circuit board (PCB) production facilities in Minsk and Brest. These studies have demonstrated that galvanic sludge can be effectively and comprehensively utilized as a component of building materials. Furthermore, the use of dried wastewater sludge allows for a reduction in the firing temperature of products by 50°C, resulting in fuel and energy savings and a reduction in sulfur oxide emissions by 68-83%, improving sanitary and hygienic conditions. Moreover, ceramic masses made with the addition of PPC and PPP wastewater sludge increase compressive strength by 1-2 grades, reduce water absorption, and increase frost resistance by 1.5-2 times, while simultaneously improving their appearance and expanding their color range. Furthermore, the addition of wastewater sludge to raw mixes for standard bricks, ceramic façade tiles, expanded clay gravel, and lightweight concrete with porous aggregates at levels of 5-15% by weight ensures environmentally friendly products that fully meet the requirements for safe operation with respect to human health and the environment, according to the conclusion of the Belarusian Research Institute of Sanitation and Hygiene of the Ministry of Health of Belarus.

Keywords: Sediment, sand, clay, expanded clay, brick, ceramics, glaze, plasticity, dispersion, strength, heat resistance, frost resistance, water absorption.

INTERMITTENT AERATION AS AN OPERATIONAL STRATEGY FOR EXCESS SLUDGE MINIMIZATION IN SMALL AND MEDIUM WASTEWATER TREATMENT PLANTS (A REVIEW)

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ABSTRACT

Excess activated sludge remains one of the most resource-intensive by-products of biological wastewater treatment, accounting for 25-60% of total plant operating costs. For small and medium wastewater treatment plants (WWTPs), sludge management represents a disproportionate operational burden due to limited infrastructure, high specific energy consumption, and restricted access to centralised disposal facilities. This review systematically examines intermittent aeration (IA) as a low-capital, operationally flexible strategy for in-situ sludge minimization. The underlying mechanisms - including endogenous respiration, metabolic uncoupling, feast-famine cycling, and aerobic/anoxic alternation - are analysed in relation to the observed sludge yield coefficient (Y_{obs}). Evidence from pilot and full-scale studies indicates that IA can reduce Y_{obs} from approximately 0.40-0.45 to 0.25-0.30 gTSS/gCOD, corresponding to a 25-40% reduction in excess sludge production, without major capital investment. The review further addresses the integration of IA with step-feed substrate distribution and recirculation control in multi-zone biological nutrient removal (BNR) schemes of the denitrification-nitrification type, identifies key operational parameters and known limitations (N_2O emissions, nitrification stability, energy demand of blower starts), and formulates a research agenda for experimental validation at small-scale WWTPs.

Keywords: intermittent aeration; activated sludge; sludge minimization; endogenous respiration; small wastewater treatment plants; biological nutrient removal