4th PAK-TURK International Conference

ON EMERGING TECHNOLOGIES IN THE FIELD OF SCIENCES AND ENGINEERING (PAK-TURK ETSE-2021)

VIRTUAL

03-04 Nov 2021

About Conference

The Pak-Turk Conference series is a technical event which focuses on the advancement in emerging technologies. The purpose of this conference is to provide a platform for researchers, academicians and practitioners to make them familiar with recent advancements in the various fields of engineering and sciences. This conference accepts wide range of papers to encourage young and experienced researchers to present their work and also the possibility of initiating mutual collaboration with international repute researchers and industry personals from Pakistan and Turkey.

BOOK OF ABSTRACT

Organized by:

GHULAM ISHAQ KHAN INSTITUTE OF ENGINEERING SCIENCES AND TECHNOLOGY • PAKISTAN •

Competence through Excellence 2005 UNIVERSITY OF WAH

Sponsored by:

HEC HIGHER EDUCATION COMMISSION

COMSTECH

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Inauguration Program Schedule

3rd November, 2021 (Day1)		
11:00-11:05 AM	Opening and Recitation of a few verses from the Holy Quran	
11:06-11:10 AM	National Anthems of Pakistan and Turkey	
11:11-11:20 AM	Welcome Speech	Prof. Dr. Fazal Ahmad Khalid, SI, Rector GIK Institute
11:21-11:35 AM	Address by the Chief Guest (Chairman COMSTECH)	Prof. Dr. M. Iqbal Choudhary
11:36-11:50 AM	Address by the Guest of Honour	H. E Ambassador of Turkey
11:51-12:15 PM	New Norms in Education – Post Covid-19 Era	Prof. Dr. Arshad Saleem Bhatti
12:16-12:30 PM	Concluding Address for the First Session	Prof. Dr. Jameel-Un Nabi, Vice Chancellor UW

Keynote Addresses
&
Technical Talks

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

New Norms in Education – Post Covid-19 Era

Arshad Saleem Bhatti

Abstract—Covid-19 has taught us many lessons as it affected almost all disciplines of life and disrupted the norms of each discipline. Education sector was the most affected one as it included students and teachers from kindergarten (KG) to University levels. Face to face teaching no longer remained an option and almost 100% teaching became online either in synchronous or asynchronous mode in this period. This created considerable problems for institutions with very little or no experience of online teaching and/or with no infrastructure for online teaching. Both the communities, i.e., teachers and students were caught unaware and were not ready mentally to accept the new mode of teaching and learning. Almost two years down the road, it has opened up huge opportunities in bringing a paradigm shift in the education and training sector. The potential of online/offline learning at various levels have been realized and the concept of "education inclusion" now seems to be a reality, where use of modern communication technologies will be able to give access to all in getting quality education at a subsidized rate. Another aftereffect is the skill set of students that will matter rather than their degrees. It will matter how quickly that skill can be learned and practiced. This talk will review the rapidly evolving new education pedagogy, which is based on the concepts of "learn whenever and where" and "education inclusion."

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Nuclear Data Evaluation and Talys

Prof İsmail Hakkı SARPÜN

Abstract—Nuclear physics, especially nuclear reaction physics includes information necessary for the design, operation and decommissioning of whole nuclear systems, which have applications in science, energy, medicine, safety, and many other industrial processes. The types of information required are as diverse as reaction cross-sections, emitted particle double differential cross sections for many different types of reactions, probabilities for different fission fragment formation and decay processes and their applications. Unfortunately, the data varies based on projectile energy, targets and their thickness potentially a factor of a million or more. It is important to have associated uncertainties for all data to quantify and propagate uncertainties in simulations. An international acceptable nuclear data library should contain all this information due to the reasons and purposes listed above. It is the task of both experimental and theoretician nuclear data physicists to establish databases of information for all the elements and isotopes that may be required. Various nuclear models and computer codes should be developed not only to establish the library, but also to ensure data consistency. Therefore, many models are used together in every nuclear reaction code available worldwide. TALYS 1.95 nuclear reaction code is generally used in theoretical calculations of cross-section, and it can also be used in evaluating nucleus structure parameters. In the input file of TALYS code, there should be four main keywords, namely, projectile (n, g, p, d, t, 3He- and a), element (target), mass (target, 12<A<339) and energy (0.001- 200 MeV, also with step). According to the intended study, appropriate keywords should be added to the input file.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Algorithmic Frameworks as a Solution to the Metaphor Burst in Metaheuristic Algorithms

Prof. Dr. Doğan Aydın

Abstract—xOne of the most important tools used effectively in solving difficult optimization problems is the use of population-based metaheuristic algorithms. Many of these algorithms are approaches presented to the literature, inspired by swarm behaviors, genetics and physics in nature, and the first examples of these approaches appeared about 40 years ago. The fact that the researchers, who offered the leading algorithms in the field such as Genetic Algorithm, Particle Swarm Optimization and Ant Colony Optimization have high h-index values and universities supports these researchers, it attracted the attention of other researchers and led them to produce similar algorithms in the following years. When the literature is analyzed, it is observed that the number of population-based metasurgical algorithms that have emerged with a new name in the last five years has increased considerably. As a result of our research, it has been observed that a new population-based metaheuristic method emerged almost every month, and a new variant of these methods is included in the literature almost every day. However, this causes great disinformation in the literature. Because it has been seen that many of these algorithms are not novel or can not outperform much other existing algorithms in the literature. Therefore, serious efforts should be made to prevent such broadcasts, although quite difficult, and some regulations should be introduced. In this talk, the importance of this problem will be emphasized and suggested solutions will be discussed. Algorithmic frameworks, which are one of the solutions, will be mentioned. More specifically, the structures and performances of ABC-X and PSO-X frameworks that we have developed will be examined.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Recycling of wastes in Building Materials

Prof. Dr. Anwar Khitab

Abstract—Industrial and agricultural wastes add to environmental pollution. They also add to the landfill requirements for dumping. Construction industry is one of the most important industries of a country, as it adds to the economic growth and development. Almost all the building materials have adverse effect on the environment. Manufacturing of cement, concrete, bricks and steel all are adding to environmental pollution. This necessitates the importance of recycling of industrial waste in building materials. In the past, several industrial waste materials like silica fumes, fly ash, and ground-granulated blast furnace slag have been successfully recycled in concrete. Manufacturing of cement and concrete not only deplete natural resources but also emit Carbon Dioxide (CO 2) to the environment. Recycling of the ingredients of these materials by compatible waste materials is a viable solution. There is need for exploration of waste materials, which can successfully replace cement and the other ingredients of concrete. Bricks are another classical building material, which utilizes natural clay. The manufacturing of brick like cement also evolves greenhouse gases. The burning cannot be avoided as it is a mandatory requirement for all ceramic materials. However, the clay in bricks can be partially replaced with various agricultural and waste materials. This leads to conservation of fertile land and reduction of landfill requirement for dumping. This presentation focusses on use of waste substances for recycling in building materials. The characterization of the waste materials, evaluation of the finished products and the applications for various residential and commercial structures are presented. This is a workable solution for the economic and sustainable growth of a society and for the conservation of environment and natural resources for the coming generation.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A Self-Consistent Explanation of Allowed and First-Forbidden Beta Transitions within pn-QRPA Formalism

Prof. Dr. Serdar ÜNLÜ

Abstract— We try to give a self-consistent explanation of the allowed and first-forbidden beta transitions within pn-QRPA formalism. The self-consistency of present approximation is based on Pyatov's restoration method [1] which was originally introduced to restore the broken Galilean invariance of pairing interaction. According to the method, the broken commutation relations between nucleus Hamiltonian and the corresponding transition operators are restored by adding a suitable effective Hamiltonian. After the consideration of this effective perturbation, the total Hamiltonian can be solved within the framework of pn-QRPA method and thus, the energies and wave functions of the collective excitations in neighbor nuclei can be obtained without using any adjustable parameter.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Preliminary results for the relationship between d_{max} and stopping power for incident electron beams

Prof. Dr. Çağatay Tufan

Abstract—To determine the radiation effects, especially in radiotherapy, absorbed dose and stopping power values of target material are the main parameters. These two parameters are strongly related each other. In our previous work (Yüksel and Tufan, 2021), we investigated this relation for electron beams incident on different biological targets and found linear relation between these two parameters as expected. By applying the curve fitting procedure, simple first order function between dmax and stopping power values was obtained. In this work, dose and stopping power values have been calculated for elemental targets from Z = 1 to 54. This early presentation involves the preliminary results for the relationship between dose and stopping power values for electrons incident on the elemental targets. In our works, stopping power values were obtained by using Roothaan-Hartree-Fock electronic charge densities as in our previous work, while dmax values obtained with Monte Carlo based software EGSnrc.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Primary Standardization by Counting Alpha-Particles at a Defined Solid Angle

Prof. Dr. Meryem Seferinogl

Abstract—The energy demand of Turkey has led policymakers to get a decision on nuclear power to supply energy to the industry. The decision has triggered the necessity to monitor the environment in terms of radiological protection. Moreover, Turkey is located on a region of great tectonic complexity. The continuation of tectonic activities have resulted in the formation of numerous cold and hot water springs [1]. Thus, strict radiological controls are required regularly. An evaluation of any release of radionuclides into the environment through various pathways is vital to ensure the low levels of health risks. The accurate and precise measurement of the activity concentration of radioisotopes at ppm (parts per million) levels in the environment is of great interest for routinely monitoring. The number of radioactivity measurement laboratories is due to increase every. These create a strong demand for accurate, traceable, and certificated activity standards. The metrology laboratories spent a great effort to develop primary standardization techniques. Primary standardization of radioactivity related with the direct measurement of nuclear transition per unit time. Their results is independent of the various nuclear decay data and associated uncertainties. Their calibration based on basic physical principles, not other radioactivity measurements. The standardisation by counting alpha-particle at a defined solid angle is one of the most accurate primary standardization methods for alpha emitting radionuclides [2-4]. The method has a wide applications on various standardisation studies, also in the studies of half-live determination for long-lived radionuclides.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

High Precision Measurement using Cavity Optomechaics

Prof. Dr. Shahid Qamar

Abstract—The field of optomechanics deals with the interaction of radiation field with mechanical objects. Typical, optomechanical systems are formed by using an optical or microwave cavity containing a movable mirror which can sustain oscillational modes. In this talk, our focus is to discuss its potential applications in high precision measurement of weak classical force and weak magnetic field.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Statistical evaluation of hypernuclei in heavy ion collisions

Prof. Dr. Nihal Buyukcizmeci

Abstract—Hypernuclei formation is one of the hot topic on nuclear and high energy particle physics during a few last decades. There are a lot of experimental facilities and groups at different laboratories and countries, e.g., FOPI, MAMI, HypHI and FAIR at Germany, STAR, ALICE at USA, NICA at Russia, RIKEN at Japan. In the experiments of these facilities, egzotic nuclei and hyper nuclei can be formed in the peripheral or in the central nucleus-nucleus collisions. We have reproduced the hypernuclei and nuclei in relativistic ion reactions. We expect that our new theoretical approach would be a pioneer to analyse hyper nuclei and nuclei which can be obtained in future experiments.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Isotope production in heavy-ion reactions

Prof. Dr. Bulent Yilmaz

Abstract—Isotope production can be achieved by diffusion of nucleons between two colliding nuclei. Timedependent Hartree-Fock (TDHF) approach, one of the standard approximations in nuclear physics, underestimates nuclear diffusion. A method called stochastic mean-field (SMF) approach is introduced to overcome this shortcoming of the TDHF approach. The SMF approach is applied on multinucleon transfer in various heavy-ion reactions and isotope production cross sections are computed and compared to experimental data.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Enhancing magnetocaloric effect in low dimensional systems

Dr Umit Akinci

Abstract—Magnetocaloric effect is defined as a temperature change in the material subject to the changing magnetic field. It has broad application areas, from cooling technology to cancer treatment applications. This effect is based on the magnetic entropy change of the material when applying a magnetic field. Therefore, in order to obtain efficient results, a large magnetic entropy change is needed. In this talk, the magnetocaloric effect in low-dimensional systems is reviewed. Due to the reduced dimensionality of these systems, some interesting properties emerge. One of the exciting properties in the magnetocaloric effect is multi-peak behavior in the magnetic entropy change by the temperature. This interesting property can be used for enhancing the magnetocaloric performance of the system. Also, in this talk theoretical results regarding the multi-peak behavior of the low-dimensional magnetic systems will be given. Tuning of the magnetocaloric performance of the materials by changing dimensionality or adjusting the material's parameters of the system will be discussed.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Ground-State Nuclear Properties and Decay Modes of Superheavy Nuclei: The Case of No Isotopes

Prof. Dr. Tuncay Bayram

Abstract—Studying of nuclear structure and decay properties of superheavy nuclei is one of the hot topics in nuclear physics. In the present study, Relativistic Mean Field (RMF) theory with versions of density dependent interactions have been applied to investigation of some ground-state properties and decay modes of some superheavy No isotopes. Triaxially deformed RMF model has been applied to calculation of ground-state binding energy and to search ground-state shape of the considered nuclei by obtaining potential energy surfaces of each nucleus. The calculated ground-state energies of the nobelium isotopes has been used to prediction of decay modes (α, β+/EC,β− and SF) and half-life of nobelium isotopes. Our results show that the No isotopes are well deformed and their shapes are predicted to be prolate in their ground state. Our predictions for decay modes and half-lives are found in agreement with available experimental data.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Use of Tomotherapy Auto-segmentation in the Delineation of Organs at Risk

Ece ATAK

Abstract—Background: Advances in radiotherapy planning have resulted in significant sparing of organs at risk (OARs), reducing radiation-induced side effects for patients with cancer of the head and neck (HNC). The accurate delineation of OAR is required to benefit of intensity-modulated radiotherapy (IMRT) for HNC. Manual delineation of structures is an extremely time-consuming and labor-intensive procedure whereas automatic segmentation takes less time. In this study, we aimed to compare the contoured OAR volumes using manual delineation and automatic segmentation. Methods: Five patients who were simulated for head and neck cancers were included in this study. OARs were delineated as following brainstem, spinal cord, eyeball, lens, optic nerve, optic chiasm, parotid glands, mandible. Following manual delineation of OAR, automatic segmentation of the same set of structures was executed. Mean volumes for each structure were calculated and compared. Results: As a result of the volume evaluations, it was observed that the most difference was in the parotid gland. In bone structures, such as the mandible, the mean volume values were noted closer to each other. All OAR volumes were given in the Table1. Conclusions: The study demonstrated auto-segmentation as a useful delineation tool in contouring OARs in head and neck cancers. It is obvious that AS cannot entirely replace manual delineation in contouring some structures in the head and neck and cannot be utilized without human intervention. It has been suggested that soft tissue structures should be manually corrected after auto segmentation.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Study of Stellar Objects in Modified Gravity

Prof. Dr. Muhammad Sharif

Abstract— In this talk, I would discuss the geometry of compact stellar objects through Noether symmetry approach in the energy-momentum squared gravity. This newly developed theory overcomes the problems of big-bang singularity and provides the viable cosmological consequences in the early time universe. Moreover, its implications occur in a high curvature regime where the deviations of energy-momentum squared gravity from general relativity is confirmed. We consider the minimal coupling model of this modified theory and formulate symmetry generators as well as corresponding conserved quantities. We use conservation relation and apply some suitable initial conditions to evaluate the metric potentials. Finally, we explore some interesting features of the compact objects for appropriate values of the model parameters through numeric analysis. It is found that compact stellar objects in this particular framework depend on the model parameters as well as conserved quantities. We conclude that Noether symmetries generate solutions that are consistent with the astrophysical observational data and hence confirms the viability of this procedure.

Paper/Extended Abstract Presentations

Paper Presentation Session
Day 1 (04:00PM – 06:45 PM)

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Mechanical Characterization of Wood Based Biodegradable Green Composite

Adeel Mehmood[1,a], Dr. Muhammad Ali Nasir[2,b], Muhammad Shahid[1,c], Muhammad Uzair Iqbal[1,d], Dr. Azhar Hussain[1,e]
[1] *Department of Metallurgy and Materials Engineering, UET, Taxila.*
[2]*Department of Mechanical Engineering, UET, Taxila*

Abstract— In recent years the importance of composites made up of renewable resources has been increased significantly due to the global demand for fibrous materials. Work is being actively pursued into the production of composites prepared using various biodegradable materials. There are many problems associated with the use of wood in composite materials due to their susceptibility to moisture and decay due to fungal activity, but on the other hand there are many benefits in the use of wood in composites, they are light weight with high strength, low friction coefficient and most importantly renewability. Furthermore, they are economical, renewable, abundant, and biodegradable. Several different types of composites have prepared in the last few years and one of them is wood based biodegradable composites. In the field of wood plastic composites, a lot of research has been done. The hypothesis is that the presence of wood in composite will enhance the mechanical properties of composites. In this research we study the mechanical properties of wood plastic composite made up of Cedar wood (local name diyar) as filler in polypropylene (PP) or low-density polyethylene (LDPE) as a matrix while as coupling agent maleic anhydride polypropylene (MAPP) will be used. Various composition of saw dust of cedar wood (10, 15, 25, 40% wt.) added into polymer and tested for mechanical and morphological properties.

Keywords—green composite, biodegradable, wood composite, polypropylene, polyethylene

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Development of an analytical design tool for preliminary structure design and weight estimation of an aircraft wing

Ahmad Altaf[1,a], Nazeer A. Anjum[2,b]
[1]*Mechanical Engineering Department, University of Engineering and Technology, Taxila*
[2] *Mechanical Engineering Department, University of Engineering and Technology, Taxila*

Abstract—This paper describes the development and implementation of a design tool for weight estimation of an aircraft wing in the preliminary design phase when adequate data required for high-fidelity analysis is unavailable. The developed tool designs the wing box structure by employing analytical formulations for inflight aerodynamic and inertial loads. Schrenk's approximation method is adopted to obtain span-wise lift distribution on the wing. A thickness-based formulation for approximating sizes of structural members is used. The weight is estimated by calculating the amount of material required to support the aircraft loads. The developed tool is validated by redesigning the LA-250 aircraft wing and comparing it with values available in the literature. The results show a good agreement between the compared values.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

3D paper-based passive microfluidic pump for higher volumetric flowrate in microchannels

Syed Farhad Shah[a], Gohar Hussain[b] and Ali Turab Jafry[c]
Faculty of Mechanical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi (23460), Pakistan

Abstract— Active pumps are commonly used in microfluidic platforms to regulate and program fluid flowrate in a microchannel. Due to their large size and continuous demand for external power, active pumps have some limitations. To circumvent these restrictions, a new generation of passive pumps based on cellulose material categorized as paper-based microfluidic pumps have recently been investigated. In this research, 3D fluid flow in cylindrical porous structure is investigated using flowrate measurements using microchannels. Whatman filter paper grade 1 was shredded, mixed with water and molded to develop 3D cylindrical pumps. CO_2 Laser Cutting/Engraving machine was used to produce patterned serpentine channel. 3D paper-based microfluidic pump was connected with the microchannel filled with water to initiate flow. Effect of paper pumping on flowrate of fluid flowing through serpentine microchannel was determined. These pumps have capability to carry larger sample volumes of liquid with improved flowrate. Moreover, they are simple, inexpensive and provide better programmability and control due to capillarity of paper. These 3D passive paper-based microfluidic pumps will bring one step closer to achieving a successful miniaturized diagnostic platform for point-of-care (POC) applications.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A simple and cost effective bifunctional active valve for flow control in paper-based microfluidics

Gohar Hussain[a], Syed Farhad Shah[b], Ali Turab Jafry[c], Sohail Malik[d]
Faculty of Mechanical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi (23640), KPK

Abstract—Paper-based microfluidics is an emerging field due to its contributions in medical diagnostic devices, food quality, analytical chemistry, and environmental sciences. These devices are low-cost, biodegradable and disposable. Previously, different techniques have been utilized for valve design, but they lag in simplicity and active control of fluid volume. In this work, a paper-based microfluidic device was designed by incorporating an active rotational valve to control both fluid flowrate and having ON/OFF functionality. Experiments were performed to measure velocity at different contact widths (rotational angles). The device was divided into three segments namely, inlet channel, valve channel, and delivery channel. The results indicated that the delivery channel having 2 mm and 4 mm contact with the valve channel provided relatively higher flow velocities mainly due to the development of 2D flow at the beginning. This valve design is simple, cost-effective and it offers more versatile and bifunctional characteristics that will help to simplify complex immunoassays reactions in the field of paper-based microfluidics.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Computational Fluid Dynamics Analysis of a Double Lumen Cannula

Faiq Ahmad1,a , Minhaj Ullah1,b, Dr. Taqi Ahmad Cheema1,c

1Faculty of Mechanical Engineering Ghulam Ishaq Institute of Engineering Science and Technology Topi, Pakistan

Abstract— Extracorporeal membrane oxygenation (ECMO) is a life support technique providing long term support to patients whose hearts and lungs can't deliver enough gas exchange or perfusion to keep them alive. One of the most important parts of an ECMO circuit is the Double Lumen Cannula (DLC) which is mainly responsible for the removal of deoxygenated blood from the patient's body and delivery of oxygenated blood to the patient's body. The current designs of DLC causes poor hemodynamic performance like high blood damage, high recirculation, and high residence time. In this study, computational analysis has been done on DLC placed in correct position. As a result, shear stress applied on blood, residence time of each blood cell in the control volume and the blood damage has been determined

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Numerical investigation of 3D printed multi-layered resistant hybrid panels under impact loading

Haris Khalid[1, a], Uzair Ahmad Dar[2, b,] Muhammad Abid[3,6 c], Riffat Asim Pasha[4, d] and Muhammad Bilal[5, e]

[1,4]*Department of Mechanical Engineering, University of Engineering and Technology Taxila, Pakistan*
[2]*Centres of Excellence in Science and Applied Technologies (CESAT), Islamabad, Pakistan*
[3,5]*Department of Mechanical Engineering, COMSATS University Islamabad, Wah Campus, Pakistan*
[3,6] *Interdisciplinary Research Center, COMSATS University Islamabad, Wah Campus, Pakistan*

Abstract - This paper presents numerical investigation to determine impact resistant limits of multi-layered panel comprised of shock absorbing fiber reinforced ceramic sheet, Nickle-titanium based shape memory alloy sheet, titanium alloy Ti-6Al-4V lattice structure manufactured through Selective Laser Melting and aluminum sheet. Heat treatment of SMA sheet for better energy absorption is performed. The numerical models of multi-layered material configuration were developed using explicit finite element solver LS DYNA and were impacted by 8mm rigid steel piercing projectile at velocity of 100m/s and 200m/s respectively. Impact performance of each configuration sheet in terms of impact limit velocity, penetration process, energy absorption and permanent deformation was quantified. It was found that multi-layered panel successfully stopped the 100m/s projectile. The numerical simulation played a vital role in optimizing the structural configuration for better energy absorption characteristic.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A numerical investigation of fuel spray characteristics of biodiesel/di-n-butyl-ether blends

Muteeb ul Haq [a], Saad Ahmad [b] and Ali Turab Jafry [c]

Faculty of Mechanical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Pakistan

Abstract—Higher viscosity of biodiesel is a major concern for its use in diesel engine. Researchers have been trying to come up with less viscous, oxygen rich fuel additives that not only improve fuel spray quality but also ensure complete combustion and reduced exhaust emissions. Several additives like ethanol, pentane, butanol, and acetone are already well known in improving the fuel spray quality, however effect of ethers on spray quality are not much explored. In this research fuel spray characteristics of biodiesel blended with di-n-butyl ether (DBE) is studied at different blending ratios and the results are charted in comparison to diesel and biodiesel fuel. Fuel spray is modelled using discrete phase model (DPM) in Ansys Fluent. Several sub models like drop drag, drop breakup and collision are coupled together to ensure the realistic spray simulation while the turbulence of the gas phase is modelled by k-ϵ model. Results revealed that higher injection pressure yields greater penetration length (PL) and smaller Sauter mean diameter (SMD) while increasing ambient pressure decreases PL and SMD. Viscous fuels yield higher drop diameters and PL. BD100 penetrates farthest followed by DBE30, DBE15 and diesel fuel.

Keywords—Biodiesel blend, Spray characteristics, Penetration length, Drop drag, Drop collision

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Experimental investigation of physiochemical properties of oxygenated castor biodiesel/diesel blend for diesel engine application

Saad Ahmad [a], Muteeb ul Haq [b] and Ali Turab Jafry [c]

Faculty of Mechanical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi 23640, Pakistan

Abstract— The serious problem of fossil fuel depletion and environmental contamination has sparked global interest in the search for alternative renewable fuel resources to fulfil human demand. Biodiesel promises to be one of the viable renewable resources owing to the qualities that match diesel fuel properties, as well as the numerous advantages it gives over diesel. It was found in previous research that Castor biodiesel blend with diesel is suited at low percentage. However, there was lack of research on low percentage blend of castor biodiesel with oxygenated additives i.e. its tertiary blends. Hence, the aim of this study was to analyze the effect of oxygenated additives on the physiochemical properties of castor biodiesel for its operation in diesel engine. B20 blend i.e. 20% percent biodiesel with 80% diesel was produced and 5% V/Vblend ethanol, butanol, diethyl ether and dibutyl ether as oxygenated additives were blended with B20. Total seven samples including D100 (conventional diesel fuel), B100 (100% Biodiesel), B20, and four oxygenated B20 samples were tested for density, viscosity, flash point and calorific value. Results obtained were then compared with conventional diesel fuel. It was concluded that dibutyl ether-based castor biofuel blend is best suited for use in diesel engines because of its low viscosity, low density, higher calorific value and suitable flash point. Furthermore, this efficient renewable biofuel blend, if commercialized, will help decrease our dependence on conventional fossil fuels and result in sustainable economic growth of our country.

Keywords—Castor Biodiesel, Oxygenated additives, Physiochemical properties, Calorific value

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Computational Investigations of Power Consumptions for Six-DOF Industrial Robotic Arm

Saqib Nasim[1,a], Dr. Afzal Khan[2,b], Salman Ahmad[3,c] and Dr. Sohail Malik[4,d]
[1,2] *University of Engineering and Technology Peshawar, Pakistan*
[3,4] *Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi Pakistan*

Abstract— Robotic arm is a modern and complex electromechanical device mostly used in automatic and semi-automatic industries. Power source is the primary requirement of robots to perform any function and continuous requirement of power is indispensable for smooth work in industries. However, some situations exist when power failure can occur from main source, so there should be an alternative power source. To tackle these power issues this study introduces the computational investigations for requirement and consumption of power. To develop and extend uses of robotic arms to diverse applications high cost will be incurred on testing and validation. Therefore, cost-effective approach of simulations and analysis of robotic arm is adopted, and this pave the way for selection of power source capacity. This study introduces the fast method of investigation of power requirements and consumption of each joint and link motion of six degree of industrial robotic arm. A CAD model of robotic arm is incorporated for simulation and analysis. Modeling and simulation were done in the ADAMS software. Each link of robotic arm was modeled with assigning the real value of mass and inertia. Frictional forces were introduced between joints to achieve real results. In this simulation robot was made to lift a ten kilogram of pay load and then move through a specified path. Power consumption of robotic arm is then analyzed in the post processor.

Keywords— ADAMS, investigation, power, modeling, CAD model, motors

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A REVIEW ON EFFECT OF WELDMETAL CHEMISTRY ON STRESS CORROSION CRACKING IN DISSIMILAR WELDMENTS OF DUPLEX AND AUSTENITIC STAINLESS STEELS

Hafiz Muhammad Yasir Saleem1,a , Dr. Nazeer Ahmed Anjum2,b and Hammad Subhani3,c 1,2,3Mechanical Engineering Department, University of Engineering and Technology Taxila, Pakistan

Abstract— Stress Corrosion Cracking (SCC) is an environmental degradation process and the resistance to SCC depends upon the metallurgical characteristics of materials. Though stainless steels possess high resistance to general corrosion, however, they mostly suffer from SCC in aggressive environments. At preeminent temperature applications, Duplex Stainless Steel (DSS) is preferred over Austenitic Stainless Steel (ASS), so it becomes indispensable to join DSS with ASS components operating at higher temperatures. In dissimilar stainless steel weldments (DSSW), different chemical compositions of base metals, filler metals, elevated temperature in the welding process, and thereafter non-uniform cooling rate causes the formation of different welding zones across the weld line. These zones exhibit different resistance to SCC due to differences in their morphology. Due to the involvement of higher temperature in the welding process, the austenite matrix (γ) in DSS and ASS completely transforms into a ferrite matrix (α) and subsequent rapid cooling causes the formation of delta ferrite (δ-Fe). The amount of δ-Fe present in microstructure is a function of ferrite facilitator elements (Cr and Mo), austenite facilitator elements (Ni and Mn), and the rate of cooling. Different filler metals are used to weld DSS and ASS, so it is important to characterize the filler metals based upon their chemical composition. In this paper, a review on the study of weldmetal chemistry and its consequent effect on the formation of undesirable precipitates and secondary phases in different welding zones which alter the resistance to SCC of DSSW involving DSS and ASS is carried out. It is found that the heat-affected zone (HAZ) is the most susceptible region to SCC and it is attributed to the presence of delta ferrite network (δ-Fe) and intermetallic secondary phases (Fe-Cr-Mo). The δ-Fe network is more electrochemically active and reduces the resistance to SCC. The slight presence of Fe-Cr-Mo makes the HAZ more brittle and results in a high rate of crack propagation.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Performance-Based CFD Study of Vertical Axis Wind Turbine Arrangements for Industrial Fan Application

Huzaifa Javaid Mughal[1], Muhammad Uzair Nadeem[1], Awais Ali[1] and Muhammad Zia Ullah Khan*,[1]
[1]*COMSATS University Islamabad, Sahiwal*

Abstract— Industrial fans are used for ventilation and generate flow patterns which can be harnessed using wind turbine for producing electricity. The numerical simulation in this paper study the flow behavior of VAWT arrangements to conclude the efficient arrangement for industrial fan application depending upon performance parameters. Finite Volume approach using Fluent as commercial software is employed for solving Steady Reynolds averaged Navier Stokes (RANS) equation using k-epsilon turbulence model with realizable wall function. The 0.63m diameter turbine model is created with S2091 airfoil having 0.06m chord length. Grid independence study is performed after careful meshing using appropriate Y+ value depending upon the turbulence model. The horizontal, vertical and triangular arrangement of the two-dimensional wind turbine is studied at a tip speed ratio of 0.5, 0.75 and 1, with fix velocity of 29m/s after finding the optimum distance between turbines. Performance parameters in the form of moment and output power are used for comparison of different arrangements at different TSR values. It is concluded from the results that by increasing tip speed ratio the coefficient of moment decreases in all the arrangements but for the triangular arrangement the decrease is gradual and maximum moment coefficient is obtained at TSR 0.2 for triangular arrangement. This is because in triangular arrangement wake losses are minimum whereas in linear and horizontal arrangement wake losses are maximum. The triangular arrangement is 33% and 13% more power efficient than horizontal and vertical arrangement. Therefore, in front of industrial fans triangular cluster of wind turbines is recommended

Keywords— Computational Fluid Dynamic (CFD); Vertical Axis Wind Turbines (VAWT); Torque coefficient (C_m); Moment; Power; Airfoil

Paper/Extended Abstract Presentations

Paper Presentation Session (Parallel)
Day 2 (01:15PM – 04:15 PM)

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Investigating effect clay fraction in sand under direct shear loading

Abdullah Nadeem Azhar[1], Zain Ashfaq[2] ,Syed Jahanzaib Bukhari[3] and Shamsher Sadiq[4]

[1,2,3]*Undergradute Students, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*
[4]*Assistant Professor, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*

Abstract—Direct shear test is widely performed in design practice to calculate the shear strength and stiffness parameters of soil. In current study, series of nine tests are conducted to investigate the effect varying percentage of clay content in sand specimens. Results are presented in terms of stress-strain behavior & shear strength (cohesion & friction angle) parameters. The shear strength parameters are calculated using Mohr Columb's failure criterion. The results indicates that increasing clay content in sand from 5 to 30% increases the cohesion and reduces the friction angle by 73% and 30% respectively. The findings of the research provides an insight to the design engineer in selection of design shear strength parameters in geotechnical engineering design practice for different clay fraction in sand.

Keywords—direct shear test, clay fraction, sand

Acknowledgment: This research has been conducted in Geotechnical Engineering Lab, DCvE, GIK Institute, Topi, Pakistan as a part of Youth Center for Research-Summer Research Program (YCR SRP-2021) *https://youthcfr.com/summer-research-program/*.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A Critical Appraisal of Transitioning from PAS 1192-2 to ISO 19650-2

Engr. M Abubakar Tariq [1,a], , Engr. Shiraz Ahmed [2,b] and Engr. Erum Aamir [3,c]

[1] Dept. of Civil Engg., FET, IIU Islamabad, [2] Dept. of Civil Engg. GIKI , [3] IESE NUST Islamabad

Extended Abstract:

Introduction: Standards play a vital role in proper and smooth implementation of a system. But putting into practice various standards while adopting a system can create confusion. For instance, PAS 1192-2 was developed to cater for the immediate of the construction industry in delivery phase. To avoid this ambiguity in the delivery phase of construction projects International Organization for Standardization produced ISO 19650-2 to replace PAS 1192-2/BS1192.

Materials and Methods This research work is aimed at to critically appraise the transition of the industry by critically analyzing both standards, i.e. ISO 19650-2 and PAS 1192-2. A critical review of both standards is undertaken by comparing and contrasting. Subsequently, critical analysis based on the review is presented in results and discussion section.

Results and Conclusions ISO 19650-2 is a first ever international standard for construction industry at the delivery stage. It is found out that there are some slight differences between both standards to make ISO 19650-2 an international standard rather than a localized UK standard, i.e., PAS 1192-2. Majority of the changes are undertaken in ISO 19560-2 to make it clearer and hence more effective. There are no in-depth changes in the standards as the core concepts of both standards are same. Transition of the construction industry from PAS 1192-2 to ISO 19650-2 would be painless for those organizations that had been working on the implementation of previous standards.

Keywords— PAS 1192-2, ISO 19650-2, BIM, Construction Project, Construction Industry

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Investigating effect of Sand Fraction in Clay on Shear Strength and Stiffness Parameters under Triaxial Loading

Asad Wadood[1], Malik Saad Tahir[2] ,Ijaz Ali[3] ,Shahzaib Haider[4] ,Fayiz Amin[5],Muhammad Hasnain[6] ,Muhammad Usman Arshid[7] and Shamsher Sadiq[8]

[1,2,3,4,5,6]*Undergradute Students, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*
[7]*Assistant Professor, Department of Civil Engineering, UET Taxila, Punjab, Pakistan*
[8]*Assistant Professor, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*

***Abstract*—**Triaxial is widely performed in design practice to calculate the shear strength and stiffness parameters of soil. In current study, tests clay mix with sand 0,10 and 20% mix are conducted to investigate the effect varying percentage of sand content in clay specimens. Results are presented in terms of stress-strain behavior & shear strength (cohesion & friction angle) parameters. The shear strength parameters are calculated using Mohr Columb's failure criterion. The results indicates that increasing 20% sand content in clay reduces the cohesion and stuffiness by 44% and 150%. The findings of the research provides an insight to the design engineer in selection of design shear strength parameters in geotechnical engineering design practice for different sand fraction in clay.

Acknowledgment: *This research has been conducted in Geotechnical Engineering Lab, DCvE, GIK Institute, Topi, Pakistan as a part of Youth Center for Research-Summer Research Program (YCR SRP-2021) https://youthcfr.com/summer-research-program/.*

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Machine Learning for Predictive Analysis in Hydraulic Engineering

Khawar Rehman

Assistant Professor, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan

Abstract—The application of machine learning methods in problems related to fluid dynamics has been in practice for over two decades, but its potential is truly being realized now because of the availability of big data in hydraulic engineering made possible by the availability of sophisticated experimental equipment and advanced numerical techniques. Out of wide array of supervised and unsupervised learning algorithms in machine learning the choice governing the selection of machine learning method depends on several factors including data characteristics, interpretability of the model, and a tradeoff between accuracy and computational time. This study presents using regression based machine learning methods for prediction of scour depth around bridge piers. We specifically explore the tree based machine learning algorithms and explore their robustness in prediction of bed elevation for extreme floods.

Keywords: Machine learning, scouring, decision trees, gradient boosting, floods.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Exploratory Investigation to Improve The Transportation System in Upper Dir

Zia ud Din [1,a], Dr. Shiraz Ahmed [1,b] and Engr. M Abubakar Tariq [2,c]

[1] *Department of Civil Engg. GIK Institute of Engineering, Sciences and Technology, Swabi, Topi KPK*
[2] *Department of Civil Engg., FET, IIU Islamabad*

Abstract—From connecting villages and towns to enabling a market route to industry, the transportation system is considered to be the backbone of a country in every walk of life. Upper Dir, which can offer the mainstay of Pakistan's tourism industry, has not been well developed or provided with a reliable transportation system; however, the existing road network is deficient and become insignificant during the winters, seizing all businesses and creating problems for locals, tourists, and trading bodies. To address this potential issue, an exploratory study is being conducted in which data related to land use distribution, socio demographics, household characteristics is collected and their impact on travel demand in rural areas such as Upper Dir is quantified. Under the consideration of significant geographic location and potential for tourism in Upper Dir an economic, and adoptable solution to these challenges and future plan for the transportation system is presented. Based on the collected data from the questionnaire from local people, it is found that local roads should be more feasible, economical, accessible, and any new mode of transportation for travel should be acceptable in the Upper Dir.

Keywords— transportation system*, travel demand, efficient road network*

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Enhancement in Plasticity Index of Clay Incorporating Organic Additives

Muhammad Usman Sajid[1,a], Dr. Azhar Hussain[1,b] ,Muhammad Shahid[1,c] , Muhammad Uzair Iqbal[1,d] , Zaheer Abbas[1,e] , Aizaz Imtiaz[1,f]

[1] *Department of Metallurgy and Materials Engineering, University of Engineering and Technology, Taxila*

Abstract— Clay is widely used for constructing material in term of bricks etc. Clay in Pakistan has relatively low plasticity. Moreover, clay in Pakistan has very less extrudability by modern methods. Manually extrusion of brick consumes high cast of labour. In Pakistan, most of clay bricks are being produced manually. It takes a lot of time to manufacture handmade bricks because of very low plasticity of clay. Purpose of this study is to enhance the plasticity of clay samples taken from two different locations of Pakistan i.e Islamabad and Muzaffargarh. Increased plasticity can produce a lot of automation and save times. For this purpose, different types of organic additives such as Maize, Populus, Kentucky grass, Sorghum and eucalyptus are used to enhance the plasticity index of clays samples. Plasticity index was increased from 6.0 % to 15.0% soil samples based on increasing plasticity, calculated using Casagrande method and by obtaining Atterberg limits. Sufficient increased in plasticity was observed in the sample containing Populus additives because of more fibrous nature of Populus. Plasticity index was increased from 6.0 percent to 15.0 percent for Islamabad clay, which is the mean value for the clays to be extruded.

Keywords—plasticity, casagrande, extrusion, atterberg limit, organic matters

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Soil Stabilization Using Ground Granulated Blast Furnace Slag

Qaisar Abbas Bashir[1, a] Muhammad Usman Arshid[1,b],

[1, a] *National Engineering Services Pvt. Ltd. Pakistan*
[2,b] *University of Engineering and Technology Taxila*

Abstract— Soil stabilization is a process to improve the engineering and physical properties of unsuitable soils and transform these poor soils into valuable construction resource. The use of site-won materials has both economic and environmental benefits Attention has shifted from the choice of materials to the choice of solutions and the advantages attached to these solutions. For non-cohesive soils, treatment can be carried out using GGBS. In this research work, GBBS was used to improve the weak subgrades. The GGBS was mixed in Varying percentages to poor subgrade soils. Modified Procter Tests were performed to study the moisture~density relationship, and CBR tests were performed in Soaked & Un-soaked conditions to measure the resulting improvement in soil bearing capacity. The research work observed significant improvement in the CBR values. It is concluded that the GBBS is a useful admixture for the economical improvement of unsuitable subgrades. Considerable financial savings can be achieved using blast-furnace slag to stabilize the layers of roads.

Keywords—Soil Improvement, CBR, Modified Proctor Test, GBBS, Innovative Soil Admixture

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

To study the effect of steel and polypropylene fibers on different properties of concrete

Obaidullah Khan[1,a], Aneeqa Mudassar[2,b]

[1]*Department of Civil Engineering ,Wah Engineering College ,University of Wah*

Abstract: Concrete is one of the most versatile building material that is strong in compression but weak in tension. This weak in tension can result in a sudden failure without any specific warning .so fiber reinforced concrete has been introduce in order to overcome this drawback and to meet the demand of modern era construction. Various types of fibers can be used in the concrete like steel, glass, nylon, jute, Polythene, Polyester, polypropylene etc. at different percentages and for each fiber it is necessary to find out which type of fiber will be used for specific conditions and at what percentage. The addition of these fibers to concrete will dramatically improve the flexural, tensile and compressive strength concrete. The main aim is to study the effect of polypropylene and steel fibers on different properties of concrete. For this beams, cylinders and cubes were casted with the percentages of 1%, 1.5% and 2% and then tested for 7 and 28 days. The result was taken as the mean of the three samples. The optimum percentage for steel was came out to be 1.5% and 1% for polypropylene. The additions of these fibers significantly improve the mechanical properties of concrete.

Keywords— fiber reinforced concrete, compressive strength, flexural strength, tensile strength, steel fiber, polypropylene fibers

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Effect of Biomass Extraction and PPA on Asphalt Binder Properties

Hasham Hafeez1,a , Syed Bilal Ahmed Zaidi2,b 1MSc Research Scholar,

Civil Engineering Department, University of Engineering and Technology Taxila, Pakistan 2Associate Professor, Civil Engineering Department, University of Engineering and Technology Taxila, Pakistan`

Abstract—A major part of economy in any country depends upon its transportation system. This transportation system requires construction of highway network and utilizes approximately 70% of asphalt which is mostly derived from natural resources. Due to high demand of transportation needs natural resources are depleting day by day. This depletion in natural resources has many environmental consequences. For this reason, many researchers are working on alternate resources for asphalt manufacturing. In country like Pakistan Sugarcane Bagasse (SCB) is produced in huge amount that causes both environmental hazard and dumping Problem. This SCB can be pyrolyzed to Bio oil that can be used as a partial replacement for asphalt binder. SCB bio-oil and poly phosphoric acid (PPA) were utilized in this study to modify traditional asphalt. All conventional tests on neat bitumen as well as modified bitumen are performed. Tests were conducted on modified bitumen with 5% bio-oil along with 0.3,0.2.0.1 and 0.05% PPA. Laboratory test results showed that bio-oil poly phosphoric acid (BOPPA) modified Asphalt binder with 5% BO and 0.1% PPA have better resistance to rutting and fatigue. So, it is quite evident from the results that SCB bio-oil can be used in asphalt along with PPA. This will provide us with a material to preserve natural resources to some extent and can help towards more sustainable environment. Keywords—sugarcane bagasse, poly phosphoric acid, bio oil, waste management

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Evaluation of Asphalt Binder Properties Modified with Waste Engine Oil and Various Additives

Shayan Abbas[1], Syed Bilal Ahmed Zaidi[1], Muhammad Aziz[1]

[1]Department of Civil Engineering, University of Engineering and Technology Taxila, PAKISTAN

Abstract: *Bitumen is obtained from natural resources which are depleting to a great extent. Waste engine oil is a waste material which is not been used properly and tonnes of it is wasted annually. Depletion of non-renewable energy resources and wastage of waste materials intrigue researchers to develop more sustainable materials. Asphalt binder has been modified with various natural and artificial additives to enhance its performance. In this research study, bitumen is modified with waste engine oil along with three other types of additives. Bitumen when replaced with waste engine oil showed decreased consistency which affects its high-temperature performance. Asphalt binder when modified with different chemical, polymer, and filler type additives; showed improved consistency previously. Poly Phosphoric Acid, Elvaloy, and Hydrated lime are used as additives in waste engine oil-modified bitumen to improve its consistency and adhesion capabilities. It is concluded from experimental results that the addition of waste engine oil decreases consistency and viscosity values while increasing the softening point. PPA reacts with bitumen chemically and improved its consistency and adhesion. Elvaloy imparts hardness to the binder and improved its consistency. Hydrated lime improved the consistency of the binder and showed good adhesion results. In all combinations, bitumen modified with 2% waste engine oil and 0.7% PPA showed the best consistency and adhesion characteristics.*

Keywords— Waste Engine Oil, Hydrated Lime, Elvaloy, PPA, Viscosity of Binder, Asphalt Binder Additives

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Introducing Simulation Based Labs in Soil Mechanics Undergraduate Course

Fahad Iqbal[1] and Shamsher Sadiq[2]

[1]*Undergradute Students, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*
[2]*Assistant Professor, Department of Civil Engineering, GIK Institute, Topi, Swabi, KP, Pakistan*

Abstract—In soil mechanics and geotechnical numerical simulations are widely used to predict the response of earth structures in current state of engineering practice. Typically, in undergraduate level soil mechanics and geotechnical only physical experiments are practiced. In this study, we selected three problems covering vertical stresses distribution, seepage analysis and one-dimensional (1D) consolidation theory from course outline of soil mechanics. We simulated the selected problems using the Finite Element Based (FEM) software ABAQUS. The simulated results for elastic case comparison with closed-form solutions (in case of vertical stress distribution and 1D consolidation theory) were used for the model validation. A manual was developed to guide an undergraduate level student about numerical modeling basis (selection of code, element type, mesh sensitivity, constitutive model, boundary conditions, loading conditions). Introducing such experiments at the Soil Mechanics level course will enable students to understand the state of art simulations in geotechnical engineering. Further, simulation based Open-Ended Labs (OELs) and Problem-Based Learning (PBLs) can be assigned to students for outcome-based learning.

Keywords—Soil Mechanics Simulations, ABAQUS, Vertical Stress Distribution, Consolidation Theory, Seepage Analysis

Acknowledgment: This research has been conducted in Geotechnical Engineering Lab, DCvE, GIK Institute, Topi, Pakistan as a part of Youth Center for Research-Summer Research Program (YCR SRP-2021) https://youthcfr.com/summer-research-program/.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Impact Of Climate Change On Environment System With Special Emphasis to Water Cycle

Engr. Erum Aamir [1,a], , Engr. M Abubakar Tariq [2,b] and Engr. Shiraz Ahmed [3,c]

[1] *IESE NUST Islamabad*
[2] *Dept. of Civil Engg., FET, IIU Islamabad*
[3] *GIKI Dept. of Civil Engg. GIKI*

Abstract: The different aspects of the environment can be condensed in the form of an environmental system. The humans and the environmental are integrated together in an intricate and interactive manner. Any change in the balance initiated by nature or anthropogenic activity will have deep devastating, catastrophic impact and consequences on humans as well as on the environment system. These environmental impacts could be of micro to planetary scales. Researchers though experiments and studies have successful established the impact of climate change on different aspect of life. Water cycle is among the top on list. This research paper targets on water cycle first, because water is life. The study not only investigates the impact of climate change on the water cycle but it also proposed various remedial, corrective and deterrent measures. These measure plans, strategies will surely bring sustainable environment if adopted and practice in our life without delay. As the deteriorating environment and its impact are well established facts now. The study suggested practices which will improve our degrading environment. Furthermore, the awareness acquires during this study also recommend to be mindful about environmental impact and propose adopting organic different measures, actions, practices, plan, strategies to diminish unpleasant impact on environment. This study also addresses Sustainable Development Goals (SDGs) number #13 i.e., Climate action, also known as the Global Goals, which were established by the United Nations (UN) in 2015 as a universal call.

Keywords— Environment, climate change, Sustainable Development Goals

Paper/Extended Abstract Presentations

Paper Presentation Session (Parallel)
Session 7-Day 2 (01:15PM – 04:00 PM)

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Design and Development of Voice Based Load Control System for Hands and Legs Disabled Persons

Waqar Ahmed[1,a], Ayla Safdar[1,b]
[1]Department of Electrical Engineering, Wah Engineering College, University of Wah, Wah Cantt

Abstract: Now a days, many people are suffering from different disabilities and they become dependent on others for their daily work. In order to bring ease in their life and to develop a feeling of self-dependency in them, numerous automation techniques are being utilized in order to make them able to control electrical loads. These techniques are less cost efficient and not in reach of every class of society. In this paper, a voice-based load control system for hands and legs disabled persons is proposed, which gives reliability to hands and legs disabled persons by controlling all the electrical loads using voice commands. Discussed system comprises of controller raspberry pi that is associated with triggering the relay module. The speech to text conversion facilitated by Google Api is proposed in the model. The uniqueness of this development is that it will potentially result in reducing the care costs per person and improving their quality of life.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

DESIGN & DEVELOPMENT OF ANDROID BASED 3D PRINTING USING STEPPER MOTORS

Hamza Bashir[1], Dr. Haris Masood[2], Syeda Haseeba Shah[3] , Saifullah[4], Hamza Irshad[5] & Memoona Sabir[6]

[1,3,4,5,6,] *Final Year Students, Department of Electrical Engineering, Wah Engineering College*
[2]*Assistant Professor, Department of Electrical Engineering, Wah Engineering College, University of Wah, Wah Cantt, Pakistan*

Abstract: The most innovative technology within the current world of science is 3D printing. This technology is additionally known as speedy prototyping that's building three-dimensional objects quickly employing a succinctly designed low weight machine that is controlled by programming the Arduino mega 2560 and victimization CAD package like Slic3r, interface. With the assistance of a 3D printer we will print any 3D styles and this reduces the value of shopping for and so it's economic written. We tend to propose the control system during this paper. The steps and direction of printing are checked by employing a stepper motor controller connected to the stepper motor. During this project, a closed-loop mechanism is used wherever it checks the quantity of steps. Whenever a step is incomprehensible it comes back to the right position and so continues with printing.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Automated Smart Home Energy Management System Using the Application of Dynamic Pricing

Yousaf Ali

Faculty of Electrical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, Khyber Pakhtunkhwa, Pakistan

Abstract:Demand Side Management is related to the cost-effective utilization of electrical power at the consumer's side. In the literature, majority of the work in this area is based on the concept of peak shaving, in which consumer shifts his load from peak hours to off-peak hours. But this may create loaded conditions during off-peak hours, which gives rise to another peak. Therefore, our model is based on peak levelling concept. Results have shown that the percentage of savings in electricity bill is increased in our model up to an appreciable value.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Biofertilizer Development and it's application in Arid Agriculture

Naheed Malik, Madiha Habib, Sidra Sana, Sobia Irum, , Sohail Hameed* Department of Biosciences, University of Wah, Wah Cantt, Pakistan

Abstract: Nitrogen and phosphorus are the major growth-limiting macronutrients required for healthier plant growth and yield, particularly in arid areas due to their low availability to the plants. Moreover, due to economical constrains the farmer community of these areas hardly follow modern agriculture practices, i.e. the use of expensive chemical fertilizers and water irrigation system and mainly rely on natural rains and legume crop cultivation, alternating it with a non-leguminous crop. These practices could partially help to compensate soil fertility, however the same is associated with very low crop yields in the areas. The present study aims to utilize the naturally existing soil bacteria, as Biofertilizers, that either get associated in true (Brady)rhizobium – Legume root nodule forming symbiosis, or a-symbiotically in the rhizosphere of non-leguminous plants that are referred to as Plant Growth Promoting Rhizobacteria (PGPR). Both (Brady)rhizobium and PGPRs when associate with plant roots can fix free atmospheric nitrogen, can solubilize insoluble soil phosphorous and produce plant growth promoting hormones, individually or in combination, henceforth resulting in a better crop yield. For this study a total of sixty (Brady)rhizobium and PGPRs were isolated from soil of Talagang (32.9166°N, 72.0666°E), Fatheh Jhang (33.566°N, 72.642°E) & Jhang Bahtar (33.7660°N, 72.3609°E), also from nodules of Arachis hypogea, Medicago sativa, Vicia sativa, as well as from rhizosphere of Zea maize, Allium cepa and Lycopersicum esculentum. All the isolates were purified and characterized for their abilities to fix nitrogen, solubilizing phosphorous and for producing plant growth hormone (indole acetic acid). Thirty isolates were found positive for single or multiple beneficial traits. These isolates comprising both (Brady)rhizobium and PGPRs were used as single strain inoculum (biofertilizers) in three separate field experiments, two at Talagang on tomato and onion crops and one at Fateh Jhang on maize crop. The initial observations at germination stage clearly indicated 100 % seed germination as compared with the control plants without inoculation. The increase in yield of various crops under high temperature and water stressed Arid climate clearly indicates the agricultural sustainability that could be achieved by using environmental friendly approach of multifunctional biofertilizers, ensuring optimum 109 cell per gram of soil.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Isolation and Optimization of Production Conditions of hydrolytic Cellulase and Amylase Enzymes from Soil Samples

Iqra Tariq[1, a], Rabia Shaheen[1, b] and Shumaila Naz[1, c]*
[1]*Department of Biosciences, Quaid Campus, University of Wah, The Mall- Wah Cantt, Pakistan-47040.*

Abstract: The utilization of hydrolytic enzymes in different industries is increasing day by day due to huge industrialization. Amylase and cellulase are the most important industrial enzymes have potential applications in the paper, food, leather, and textile industries. In the present study, 10 soil samples which were collected from different areas of Pakistan was screened for the production of amylase and cellulase enzymes. A total of 100 strains were screened out, 22 showed cellulase activity while 32 showed amylolytic activity on 1% (carboxymethyl cellulose) CMC and starch agar plates, respectively. Isolate TX-10 showed profound cellulolytic and amylolytic activities in both solid and liquid fermentation media. Morphological, biochemical, and gram staining studies demonstrated that Tx-10 belong to the genus *Bacillus*. Results of physical parameters such as temperature, pH, incubation time, and substrate revealed that the optimum pH 7.0 and 6.0, and optimum temperatures 50 ℃ and 40 ℃ were the best suited physical parameters to obtain maximum cellulase and amylase activities i.e., 0.98 U/ml and 2 U/ml, at 24 hours of fermentation, respectively.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Banana tissue culture and role of nanoparticles

Khizar Nazir[1,a] and Syed Waqas Hassan[1,b]
[1] *Department of Biosciences, University of Wah*

Abstract: Bananas (Musa spp.) are among the world's most valuable agricultural food crop growing in tropic and subtropics like America, Australia, and Brazil etc. traditionally banana propagated by using suckers but tissue culture is more effective than conventional way. Many hurdles are there in way of successful tissue culture but contamination (bacterial and fungal) stood tall among them. Alongside other factors improper sterilization of explant responsible for contamination. Sodium hypochlorite (NaOCl) with few drops of tween 20 and Mercuric chloride ($HgCl_2$) frequently used sterilizing agents in banana tissue culture. Sometimes along with these chemicals antibiotic such as Rifampicin used as a part of media to control microbial (endophytic) growth. Nanoparticles such as Zn ad ZnO are recent and another effective way to control contamination

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

CLOSED FORM SOLUTION OF AN EXPONENTIAL FUNCTION BY DIAGONAL OF DIAGONAL DIFFERENCE TABLE

Fatima Farrukh 1,a , Dania Tahir 2,b 1

Kinnaird College For Women 2Kinnaird College For Women

Abstract: Numerical analysis is the area of mathematics which is used to analyze problems. This paper generates closed form solutions of exponential function. The solution is obtained by using various interesting techniques such as Forward Difference Table, Diagonal of Diagonal approach and Exponential Function.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Recycling of waste lube oil by acid clay treatment method

Saqib Mujtaba1 ,Munzar Badshah1 , Shozab Mehdi1 , Kamran Alam1

1Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, Pakistan

Abstract: Waste lube oil when disposed improperly it will cause environmental pollution. To decrease the environmental pollution the lube oil recycling techniques are being used. The main aim of this study and performing experiments was to recycle the waste lube oil by decreasing the number of contaminants from it and to investigate the best optimized values of acid and clay for the recycling process. We used different concentration of sulphuric acid and hydrochloric acid by varying the amount of clay. Concentrations of acids used were 98% and 95% sulphuric acid and 95% and 90% hydrochloric acid. The ratio used for clay & 98% conc. sulphuric acid was 30/27.6 and 40/27.6 by gram respectively and the ratio used for 95% conc. sulphuric acid was 40/26.13 grams and found different percentage of reduced sulphur contents and ash contents. The ratio of clay to HCl 95% conc. and 90% conc. HCl was 50/17.7 by gram was used. The optimized values investigated were 98% concentrated sulphuric acid and 30g of clay (30/27.6 clay/acid) reduced the sulpher contents from 0.13 to 0.016 and ash contents from 0.9 to 0.2 when reacted with the waste lube oil.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Production of Algal Oil from Algal Biomass employing Photo Bio-Reactor & Soxhlet Extraction

Abdul Wahab[a], Khurram Imran Khan[a], Kamran Alam[a]
[a] Ghulam Ishaq Khan Institute of Engineering Sciences and Technology

Abstract: The high dependency on fossil fuels such as natural gas and crude oil for energy utilization negatively impacts our environment. Researchers worldwide are focusing on renewables energy resources, less carbon dioxide and nitric oxide emission fuels. In searching for a greener energy source, biofuel production from a microorganism such as micro-algae is the most promising and efficient technology. Microalgae can be cultivated to serve as a cheap and efficient renewable feedstock for algal oil generation, which can be employed as a precursor to sustainable bio-fuels such as diesel, gasoline and jet fuel. For algal oil production, an airlift photobioreactor was designed to grow algae under controlled operating conditions, and then algae are transformed to algal oil by the Soxhlet extraction method. The design procedure employs modelling and fabrication of a 6.6L small scale non-commercial unit of Pyrex glass as a bioreactor. Chlorella Vulgaris, a micro-algae, was placed in the bioreactor exposed to the action of carbon dioxide and air under a controlled flowrate. In the semi-continuous mode, growth was maintained with constant consideration of temperature and pH. The growth rate of micro-algae was assessed for varying perimeters, including the rate of airflow, nutrient concentration, and harvesting ratio. Mature algae were obtained through the utilization of nutrients, light, inflow of carbon dioxide and air. The ferric chloride flocculant was used to acquire the solid biomass. This flocculation is followed by subsequent drying and transformation of biomass to algal oil by Soxhlet extraction**.** The pour point and cloud point of obtained oil calculated were 0°C and 5°C, respectively, which are close to the values in the literature. Transesterification of algal oil is commonly applied for the procurement of biodiesel, a potential fuel for automobiles

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

A Survey on Social-Based Buffer Management Policies in Delay Tolerant Networks

Numan Nasir*, Dr Qasier Ayyub**

Department of Computer Science University of Wah

Abstract: Delay Tolerant Network (DTN) a network which is responsible for the transmission of data from source to destination over an extreme distance for example encountered in space communication and in interplanetary scale. While creating a Delay Tolerant Network (DTN),There are many aspects that need to be considered for an efficient and effective network. One aspect is the buffer management policy. Buffer is a temporary storage that is used to store messages. The term Buffer management in Delay Tolerant Network is concern with the strategies that are used to determine which packets are needed to move, forward and drop. In this paper a comprehensive survey and analysis on existing buffer management strategies are provided. These buffer management strategies are categorized on the basis of features

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Analysis of Terminal Velocity from Drag Coefficient Used in Bubble Swarms

Khurram Imran Khan[1, a], Gurmeet Kaur[2, b], Abhishek Dutta[3,c], Muhammad Usman[1,d], Ramzan Abdul Karim[1,e]

[1]*Faculty of Materials and Chemical Engineering, Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, KP, Pakistan*

[2] *Chair of Process Systems Engineering, Technical University of Munich, Freising, Germany*

[3] *Department of Chemical Engineering, Izmir Institute of Technology, Gülbahçe Campus, Urla, Izmir 35430, Turkey*

Abstract: The numerical simulation of multiphase flows for instance gas/liquid contactors, the bubble column or the dissolved oxygen flotation (DAF) systems is important for the design and development of various (bio)chemical and metallurgical processes. For this, often higher-level models are utilized to interpretation of the important physical phenomena occurring at the lowest length and time scales using algebraic closure relations. An important closure for gas-liquid flow is the drag force as it controls the terminal rise velocity of the bubbles. However, the values of drag coefficient for swarms of bubbles is different as compared to single bubble due to complex inter bubble interfaces and larger gas holdup. In this study, a systematic comparison of different drag models based on bubble–bubble (or 'swarm') interactions with the standard single bubble drag model have been made to understand their effect on terminal rise velocity. The study tries to address the need to calculate drag coefficient based on bubble-bubble interactions rather than based on a single bubble as commonly reported in the literature.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering
(3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Effects of Plant Growth Promoting Rhizobacteria (PGPR), Salicylic acid (SA) andZinc sulphate on growth and production of roses, oil yield and characteristics of rose water

Mian.M. Amanullah & AsghariBano,
Department of Biosciences, University of Wah,

Abstract: The present investigation was aimed to evaluate the effect of Plant growth promoting rhizobacteria (PGPR) and Salicylic acid (SA) on growth and yield of rose water and rose oil. Fresh cuttings of two rose cultivars (*Rosa centifolia* and *Rose gruss-an-teplitz*) 600 of each cultivar was obtained from2-3 years' oil rose shrubs from Floriculture research area, University of Agriculture Faisalabad. The experiment was conducted both in field and in pots under shade. The pots were sterilized and the soil was auto claved. Growth parameters, leaf area, number of branches, flower production were recorded at flowering stage. Rose water was extracted from flowers by steam distillation and rose oil was extracted by solvent extraction method and organoleptic analysis of rose oil was determined. The results revealed that all the treatments enhaced all growth parameters as well as increased the oil content as well as the quality of rose water and rose oil. Combined treatment of *Pseudomonas* spp with Salicylic acid showed maximum increases in leaf area (26%), number of buds (100%), plant height (114%) and number of flowers (70%) as compared to untreated control. In pots *Bacillus* spp was more effective than *Pseudomonas* spp and showed (325%) increases in stem girth and number of flowers (420%), number of buds (25%) and plant height (26%) as compared to control. The maximum essential oil was obtained from *Rosa centifolia* treated with *Pseudomonas* spp + Salicylic acid (SA). Whereas the maximum essential oil from *Rosa gruss-an-teplitz* was obtained from flowers treated with *Bacillus* spp + Zinc sulphate. Organoleptic analysis revealed that roses treated with *Pseudomonas* spp + Salicylic acid (SA) was highly aromatic and sweet in flavor in *Rosa gruss-an-teplitz* whereas, *Bacillus* spp with Salicylic acid (SA) improved sweetness in flavor in *Rosa centifolia.* The plants treated with Salicylic acid (SA) alone and with PGPR did not show any pest or parasite attack. PGPR alone and more so in combination with Salicylic may be implicated to improve growth and yield of rose flowers and improve the aroma of rose oil and to protect the plant from diseases.

4th Pak-Turk International Conference on Emerging Technologies in the field of Sciences and Engineering (3-4th November, 2021)

Organized Jointly by: GIK Institute & University of Wah

Closing Schedule

4th November 2021 (Wednesday)		
04:00-04:15 PM	Advances in AI	Prof. Dr. Yasar Ayaz
04:16-04:25 PM	Recap and Conference Statistics	Dr. Zahid Halim (Secretary)
02:26-04:35 PM	Thought sharing by Pakistani Speakers	Pakistani Speakers
04:36-04:45 PM	Thought sharing by Turkish Speakers	Turkish Speakers
04:46-05:00 PM	Vote of Thanks	Vice Chancellor UoW
05:00-05-15 PM		Rector GIK Institute, Conference

PATRON-IN-CHIEF

Prof. Dr. Fazal Ahmad Khalid,
Rector, GIK Institute

Prof. Dr. Jameel-Un Nabi,
Vice Chancellor, University of Wah

Conference Secretary

Dr. Zahid Halim
Associate Professor, Faculty of Computer Science and Engineering, GIK Institute

Dr. Syed Waqas Hassan,
Associate Professor, Department of Biosciences, University of Wah

Conference Co-Secretary

Dr. Shamsher Sadiq
Assistant Professor, Department of Civil Engineering, GIK Institute

Contact Us

4th Pak-Turk International Conference
On Emerging Technologies in Field of Science & Engineering
Email: shamsher.sadiq@giki.edu.pk
http://www.uow.edu.pk/pakturk/
https://www.giki.edu.pk/PakTurk/