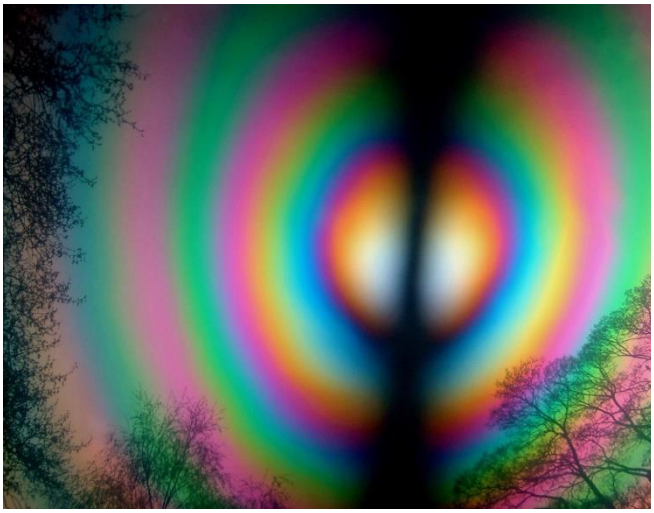
Nature's Optics and Our Understanding of Light
Michael Berry, University of Bristol, UK

Abstract. Optical phenomena visible to everyone abundantly illustrate important ideas in science and mathematics. The phenomena considered include rainbows, sparkling reflections on water, green flashes, earthlight on the moon, glories, daylight, crystals, and the squint moon. The concepts include refraction, wave interference, numerical experiments, asymptotics, Regge poles, polarisation singularities, conical intersections, and visual illusions.



SESAME: An Opportunity for Science in the Middle East

Giorgio Paolucci
Scientific Director of SESAME

Abstract : The dream of SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) is now reality. Two beamlines (XAFS/XRF and IR) are presently installed and producing scientific data. The user program started in summer 2018. One more beamline is foreseen to start operation in early 2019 and a fourth one in 2020. During the talk, the status of the accelerator complex as well of the first beamlines will be reported and the perspective use of the facility by scientists in the Region and from all over the World will be presented.

Science Communication: Take Charge of it!
Matteo Rini,
Editor of the American Physical society USA

Abstract : Scientists have a responsibility to share the meaning and implications of their work, but receive little training in communication, and often feel unprepared to communicate with the public, the media, funding agents, and even with other researchers. In this talk, I will share some thoughts on science writing and communication drawn from my experience as a writer, editor, press officer and scientific consultant to policy makers.

Mathematics Talks

On Recent Advances of the 3D Euler Equations by Means of Examples
Edriss S. Titi
Texas A&M University

Abstract In this talk we will use a basic example of shear flow to demonstrate some of the recent advances in the three-dimensional Euler equations. Specifically, this example was introduced by DiPerna and Majda to show that weak limit of classical solutions of Euler equations may, in some cases, fail to be a weak solution of Euler equations. We use this shear flow example to provide non-generic, yet nontrivial, examples concerning the immediate loss of smoothness and ill-posedness of solutions of the three-dimensional Euler equations, for initial data that do not belong to $C^{1,\alpha}$. Moreover, we show by means of this shear flow example the existence of weak solutions for the three-dimensional Euler equations with vorticity that

is having a nontrivial density concentrated on non-smooth surface (vortex sheet). This is very different from what has been proven for the two-dimensional Kelvin-Helmholtz (Birkhoff-Rott) problem where a minimal regularity implies the real analyticity of the interface. Furthermore, we use this shear flow to provide explicit examples of non-regular solutions of the three-dimensional Euler equations that conserve the energy, an issue which is related to the Onsager conjecture. Eventually, we will discuss the recent remarkable work of De Lellis and Sz´ekelyhidi concerning the wild weak solutions of Euler equations and their non-uniqueness. In particular, we propose the following ruling out criterion for non-physical weak solutions of Euler equations: “Any weak solution which is not a vanishing viscosity limit of weak solutions of the Navier-Stokes equations should be ruled out”. We will use this shear flow, and other solutions of Euler equations with certain spatial symmetry, to provide nontrivial examples for the use of this ruling out criterion. This is a joint work with Claude Bardos.

On Weakly mn-Closed Ideals and mn-Von Neumann Regular Rings

Ayman Badawi
American University of Sharjah/ UAE

Abstract Let R be a commutative ring with $1 \neq 0$, I a proper ideal of R, and m and n positive integers. In this talk, we define I to be a *weakly* (m,n)*-closed ideal* if $0 \neq x^m \in I$ for $x \in R$ implies $x^n \in I$, and R to be an (m,n)*-von Neumann regular ring* if for every $x \in R$, there is an $r \in R$ such that $x^m r = x^n$. A number of results concerning weakly (m,n)-closed ideals and (m,n)-von Neumann regular rings are given.

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Some Open Problems on Weak-Injectivity and Weak-Projectivity

Mohammad Saleh and Ali Abdel-Mohsen
Birzeit Uuniversity, Palestine.

ABSTRACT. The purpose of this paper is to survey some of the most important results on the theory of weakly injective and weakly projective modules a generalization of injective and projective modules and raise some of the fundamental open problems in this area. It is shown that For a module M, there exists a module K such that $K \oplus N$ is weakly injective, for any $N \in Mod-R$. Similarly, if R is projective and right perfect, then there exists a module K such that $K \oplus N$ is weakly projective, for any N. Among others, For some classes $\mathcal{K}$ of modules in $Mod-R$, we study when direct sums of modules from $\mathcal{K}$ satisfies a property $\mathbb{P}$. In particular, we get characterization of locally countably thick modules a generalization of locally $q.f.d.$ modules. Characterizations of rings over which every weakly injective is weakly projective and conversely are given. Finally, we conclude with several open questions. The following are some of these problems:

(1) Characterize rings over which every (weakly)tight right R-module is weakly projective (cotight).
(2) Characterize rings over which every cotight right R-module is weakly injective (tight, weakly tight).
(3) Characterize rings over which the product of weakly projective (cotight) is weakly projective (cotight).

Dynamics of Curved Fronts in Systems with Power-Law Memory

Mohammad Abu Hamed
Haifa / Palestine

Abstract : The dynamics of a curved front in a plane between two stable phases with equal potentials is modeled via two-dimensional fractional in time partial differential equation. A closed equation governing a slow motion of a small-curvature front is derived and applied for two typical examples of the potential function.Approximate axisymmetric and non-axisymmetric solutions are obtained.

Matrix Models for Discrete Time Dynamics of Biological Populations

Jim Cushing
University of Arizona /United States, USA

Abstract : Matrix models describe discrete time dynamics of biological populations structured by a finite number of discrete physiological categories of individuals age size etc.. A basic question concerns survival or extinction i.e. the stability of the extinction

equilibrium state. When the extinction equilibrium is destabilized a resulting bifurcation gives rise to possible survival states. The properties of these states depend on the direction of bifurcation and on the primitivity or imprimitivity of the projection matrix defining the model. I will also discuss this basic bifurcation in models extended to include Darwinian evolution of model parameters. I will include some specific applications motivated by field observations made by my collaborators at a National Wildlife Refuge located in the northwestern United States where climate change is having a significant effect on colonies of marine birds.

Method of Moments Estimators of Finite Population Parameters Under Complex Surveys
Abdulhakeem Eideh
Al-Quds University / Palestine

Abstract :The sample distribution is the distribution of the observed outcomes given the ed sample. Similarly the response distribution is defined as the distribution of the responded outcomes given the responded subsample. In this paper we derive some new relationships between the moments of the response sample and population distributions and use them for providing new justifications for the broad use of probability weighted estimators in case of full response and non response for single-stage sampling. We illustrate the results by finding the method of moments estimators of: the finite population mean the finite population variance the finite population multiple linear regression coefficients the census log-likelihood function and the finite population total for single-stage sampling.

$u\tau$-Convergence in locally solid vector lattices
Dr. Mohammad Marabeh

Palestine Technical University-Kadoorie (PTUK)
mohammad.marabeh@ptuk.edu.ps

Abstract

Let (x_α) be a net in a locally solid vector lattice (X,τ); we say that (x_α) is unbounded τ-convergent to a vector $x \in X$ if $|x_\alpha - x| \wedge w \xrightarrow{\tau} 0$ for all $w \in X_+$. In this talk, we present general properties of unbounded τ-convergence (shortly, $u\tau$-convergence). $u\tau$-Convergence generalizes unbounded norm convergence and unbounded absolute weak convergence in normed lattices that have been investigated recently. We introduce $u\tau$-topology and study metrizabililty and completeness of this topology.

On the Global Existence and Decay of Solutions to A nonlinearly Damped Wave Equation with Variable Exponents and Delay
Mohammad Kafini
KFUPM University / Saudi Arabia

Abstract : In this talk we will discuss the global existence of solutions to a nonlinearly damped wave equation with variable exponents and delay. We recall the definitions of the variable exponent Lebesgue spaces together with the variable exponents Sobolev spaces and some of their properties to prove under sufficient conditions on the initial data a stability result.

Unsupervised Diabetic Retinopathy Exudates Segmentation Using Fuzzy C-means FCM Clustering,
Hadi Hamad&Tahreer Dwickat
An Najah National University /Palestine.

Abstract : Diabetic Retinopathy DR is the most serious complication eye disease of diabetics' patients it occurs when the small blood vessels have a high level of glucose causing a change in the retina which occurs over a period of time under diabetics this

change cause blur vision and if left undiagnosed and untreated it can eventually lead to blindness. Exudates are one of the primary signs of DR they appear as yellowish areas with varying sizes shapes and locations about areas of leakage therefore early detection and timely treatment can prevent and delay the risk of vision loss. Current methods of DR detection are manual expensive and require trained ophthalmologists so it was therefore thought to find an alternative method. Automatic computerized screening could facilitate the screening process reduce inspection time and increase accuracy which is vital in ophthalmic treatment. In this research we proposed an automatic method to detect exudates retinal digital images with non-dilated pupils of retinopathy patients based on fuzzy c-means FCM clustering technique with a combination of morphology and pre-processing techniques. Before detecting the exudates we eliminate both OD and blood vessels network the retinal image a preprocessing of contrast enhancement is applied to enhance the quality of the input image. Afterwards the most effective features are extracted then used as input data for FCM method. Finally the detection overall performance is evaluated by comparing the successful detected exudates with the ground truth GT that are drawn our expert ophthalmologist by measuring sensitivity specificity and accuracy which found to be very promising on the testing studied database.

Global Dynamics
Saber Elaydi .
Trinity University / USA

Abstract : In this talk we present the latest development on the global dynamics of discrete dynamical systems or autonomous difference equations. Complete determination of global dynamics has been successful in the study of monotone and triangular systems. Partial results are obtained for general systems modeling biologicalphenomena or economics endeavors. Open problems and conjectures will be given.

On the Solution of Einstein Field Equations.
Yousef Zahaykah
Al Quds University / Palestine

Abstract : The subject of the talk is the studying of Einstein Field equations EFEs. Such equations play an important role in understanding the theory of general relativity and related phenomena such as gravitational waves. Since in general it is almost impossible to find analytical solutions of EFEs it is necessary to approximate the solutions of these equations. In this talk we derive the Einstein field equations EFEs and the standard ADM Arnowitt Deser and Misner equations form of EFEs. The ADM form consists of constraint equations and evolution equations for the raw spatial metric and extrinsic curvature tensors. The corner stone in the derivation of this form is 31 formalism where one splits spacetime into three-dimensional space on the one hand and time on the other. The BSSN Baumgarte Shapiro Shibata and Nakamura formulation of EFEs is also considered and a numerical experiment is proposed. Further in this talk we apply the Optimal Homotopy Asymptotic Method OHAM and solve the Einstein field equations corresponding to Schwarzschild geometry that is we determine the Schwarzschild solution using OHAM.

Enclosure of the Range of a Complex Polynomial Over a Complex Interval.
Jihad Titi[1] Jürgen Garloff1, [2]
[1]Department of Mathematics and Statistics, University of Konstanz, Konstanz
[2]Institute for Applied Research, University of Applied Sciences / HTWG Konstanz, Konstanz,
Germany

Abstract : Bounding the range of a function over a given region is an important task which

is inherent in a remarkable variety of problems in mathematics and many of its applications. These include quantitative estimation of the remainder terms in numerical integration and differentiation, sensitivity analysis of systems, the certification of properties of functions like monotonicity and convexity, and branch and bound methods in global optimization, to name only a few. In this talk, we consider complex polynomials which arise in many areas such as control systems, image and signal processing, and coding theory. The regions over which the range of such polynomials are sought are axis-aligned compact regions in the complex plane called complex intervals. The tool we are using is the expansion of the given polynomial into Bernstein polynomials. The convex hull of the coefficients of this expansion, the so-called Bernstein coefficients, provides an enclosure for the range of the given polynomial over the complex interval. In contrast to the case of real polynomials, the use of the Bernstein polynomials for finding an enclosure for the range of a complex polynomial over a region in the complex plane has been considered in only a few papers so far [1, 2].
We first briefly recall the expansion of a multivariate real polynomial into Bernstein polynomials over a box and some of its fundamental properties as well as from [3] a matrix method for the computation of the Bernstein coefficients. We present the Bernstein expansion for a complex polynomial which is applied for finding an upper bound for the modulus of a polynomial. It turns out that the computation of the range of a complex polynomial over a complex interval can be reduced to the calculation of the range over its boundary. We discuss some methods for the computation of the Bernstein coefficients of a complex polynomial and extend them to multivariate complex polynomials [4].

Automorphism Groups of Homogeneous Structures
Daoud Saniora
Palestine

Abstract :A special class among the countably infinite relational structures is the class of homogeneous structures. These are the structures where every finite partial isomorphism extends to a total automorphism. A countable set the ordered rationals and the random graph are all examples of homogeneous structures. We will see some connections between the automorphism group of a homogeneous structure M and certain combinatorial properties of its age the class of finite structures embedded in M. In particular we will discuss the existence of ample generic automorphisms and the small index property of AutM.

A Combinatorial Problem in Botanical Epidemiology.
Ziyad AlSharawi,
AUS

Abstract: In this talk we discuss a mathematical problem arising botanical epidemiology. We consider a row of n plants in which m of them are infected. We develop a rigorous mathematical approach to investigate the total number of ways to obtain k isolated individuals among m infected plants. We give a recurrence relation in three parameters that describes the problem then we find a closed form solution. Finally we find interesting formulas for the expectation and variance of the random variable that represents the number of infected and isolated plants.

Targeting New Problems in Quantum Mechanics within the Framework of the Asymptotic Iteration Method
Abdullah Sous[1], I. A. Assi[2]
[1]QOU ,Palestine
[2] Memorial University of Newfoundland, Canada

Abstract : In 2003 Hakan Ciftci el al [1] have developed new method called the Asymptotic Iteration Method AIM which solves eigenvalue problems like Schrodinger equation [2]. The importance of the method appears when solving the eigenvalue equation for systems that do not have exact solutions. For example an important task in quantum physics is to solve the wave equation Schrodinger equation Dirac equation etc. for some type of physical interaction like the case of diatomic molecules [3] and other systems [4 5] where in many of these cases exact solutions do not exist. Other problems targeting Schrodinger equation have been studies in [6-14]. Very recently we have proposed new problems in quantum mechanics with short range potentials in which we were able to present accurate numerical results using the AIM [15 16]. These new findings are expected to have different applications in nuclear and molecular physics where these kinds of physical interactions appear. We are interested to expose our new findings in our talk at the conference.

Lie-Theoretic Generating Relations of Hypergeometric Functions
Marwan Elkhazendar and Mohammed Al-Aydi
Al Azhar University /Gaza, Palestine

Abstract: In this paper we derived several generating relations involving the hypergeometric functions 2F1a b; c; x by the group theoretical method known as Wisner's method. We have considered a three parameter Lie group by giving a suitable interpretation to the numerator parameter a of the hypergeometric functions and obtained some known as wellas some new generating relation for hypergeomtric functions. Some particular cases of these relations are also investigated.

A Second Order Finite Difference Scheme for a Variable Infection-Structured Model of Mycobacterium Marinum Dynamics in Aquatic Animals
Ackleh Azmy
University of Louisiana
Lafayette, USA

Abstract: We present a novel second order finite difference scheme for a model describing the transmission of Mycobacterium marinum in aquatic animals. Convergence of the finite difference approximation to the unique weak solution of the model is shown. Numerical results confirming the second order convergence of the scheme are presented. The computational advantages of using this high-resolution scheme in comparison with a first order scheme previously used in Ackleh et. al 2014 are illustrated.

Localized Spot Patterns for the Brusselator Reaction-Diffusion System
Raed Maraabeh
AAUJ / Palestine

Abstract: The Brusselator reaction diffusion model RD characterizes dynamical processes of some reaction diffusion systems in chemistry physics biology and geology. The solutions of the Brusselator reaction system center on a discrete set of points on the sphere.
In this work we study the system of differential algebraic equations DAE that describes the slow dynamics of localized spot patterns for the Brusselator RD model on the surface of a unit sphere. The DAE system is solved numerically using Matlabs ode15s function. The equivalence between the equilibria of the DAE system and the set of elliptic Fekete points is studied. Precisely the solutions of

DAE system are obtained solving the elliptic Fekete optimization problem. The optimization problem is solved using the particle swarm optimization method.

Triangle Centers to Tetahedral Centers

Ismail Hammoudeh, Mowaffaq Hajja
Al-Ahliyya Amman University
Jordan

Abstract : In the context of constructing tetrahedral centers given triangle centers the generalization of the orthocenter is considered. It is shown that the Monge-point is only one out of many possible interesting generalizations. A \super\"-center is proposed and the question of the special status of the classical centers is discussed.

Root location of polynomials whose finite Hurwitz matrix is totally nonnegative

Mohammad Adm[1, 2] Jürgen Garloff[2, 3] Mikhail Tyaglov[4]

[1]Palestine Polytechnic University, Hebron, Palestine
[2]University of Konstanz, Konstanz, Germany
[3]University of Applied Sciences, Konstanz, Germany
[4]Shanghai Jiao Tong University, Shanghai, China

A real matrix is called *totally nonnegative* if all of its minors are nonnegative and a real polynomial is named *stable* (*quasi-stable*) if all of its roots have negative (nonpositive) real parts. The *infinite Hurwitz* matrix of a real polynomial

$$p(x) = a_0 x^n + a_1 x^{n-1} + \ldots + a_{n-1} x + a_n, \qquad a_0 > 0,$$

is given by

$$H_\infty(p) = (a_{2j-i}), \quad i, j = 1,2, \ldots,$$

and the *finite Hurwitz* matrix *of* p, denoted as $H_n(p)$, is the $n \times n$ leading principal submatrix of $H_\infty(p)$. It is well-known that the total nonnegativity of $H_\infty(p)$ is equivalent to the quasi-stability of p [2,3]. In [4], Kemperman showed that $H_n(p)$ is nonsingular and totally nonnegative if and only if p is stable. The totally nonnegativity of the finite Hurwitz matrix $H_n(p)$ does not imply stability of p [2]. In this talk, we completely describe the root location of the polynomial p whose finite Hurwitz matrix $H_n(p)$ is totally nonnegative [1] including the result in [4] as a special case.

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A Unified Derivation of the Explicit and Implicit Finite Difference Time Domain Schemes for Modeling Dispersive Graphene Material

Omar Ramadan
Eastern Mediterranean University / Turkey

Abstract : Graphene which is considered to be a one-atom thick layer has recently attracted tremendous interest due to its unique properties in microwave and terahertz THz spectra. This increases the interest in developing accurate and efficient numerical models to simulate graphene. The explicit finite difference time domain FDTD method has been successfully used for graphene simulations in the time domain. Nevertheless the stability of this scheme is bounded by the standard Courant-Friedrichs-Lewy CFL limit. In recent years the locally one-dimensional LOD and the alternating directional implicit ADI schemes have been successfully introduced for removing the CFL stability limit of the FDTD simulations of graphene. In the presented study a unified derivation of the explicit and implicit FDTD schemes for modeling graphene dispersion is introduced. As it will be shown the explicit and the implicit FDTD formulations can all be derived a specific approximation of the exponential evolution operator EEO. Moreover the formulations allow modeling different dispersive materials in the same manner.

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Math is the Base of the World Future Economic

Mohammad Abu Omar
Al-Quds Open University QOU /Palestine

Abstract: Bitcoin is a virtual currency. This means that it only exists digitally, it does not have physical notes or coins, and it can be used to buy things on the internet.Bitcoin is a future challenge from the regulatory economy perspective. It is spread to be accepted around the world. So, it has an effect in stabilizing the market value in the global economy. This widespread of using the Bitcoins would mean a change in the international monetary system. So, how does the Bitcoin build? The short answer is a Math. For example, Bitcoin uses something called 'elliptic curve cryptography' to ensure the security of transactions between owners of Bitcoins. Elliptic curve cryptography is a type of public key cryptography, relying on mathematics to ensure that a transaction can be secure.Thus, Mathematics is the material and the base of the future digital currency, which means that Math may be the base of the world future economic.

Finite Element Method for Solving Unsteady MHD Flow Through Porous Medium Between Two Parallel Flat Plates

Abdellatif Sa'adAldin
An Najah University / Palestine

Abstract :Finite element solution of unsteady magnetohydrodynamics MHD flow of an electrically conducting incompressible viscous fluid past through porous medium between two parallel plates is presented in the presence of a transverse magnetic field and Hall effect.Theresults obtained some test cases are then compared with previous published work using the finite difference method FDM. Numerical examples show that the finite element method FEM gives more accurate results in comparison with the finite difference method FDM.

Solving Local Fractional Fredholm Integral Equation of the Second Kind with Separable kernel

Hind Sweis

Mathematics Department, Birzeit University, Ramalla, Palestine

email: hksweis@birzeit.edu

Abstract

The local fractional integral equations are one of the applications on local fractional calculus, this work study the local fractional fredholm integral equation of the second kind

$$u(x) = f(x) + \frac{\lambda^\alpha}{\Gamma(1+\alpha)} \int_a^b k(x,t)\, u(t)\, (dt)^\alpha$$

where the function $k(x,t)$ is called the kernel of the local fractional integral equation, $f(x)$ is alocal fractional continuous function, λ^α is aparameter, the limits of integration a and b are constants and the unknown function $u(x)$ can be appears linearly under the integral sign.

In this work, we will deal with separable kernel, thats mean the kernel $k(x,t)$ can be expressed as a sum of finite numbers of terms each of which is a product of a function of x only and a function of t only

$$k(x,t) = \sum_{i=1}^{n} f_i(x) g_i(t)$$

and then solve the local fractional fredholm integral equation of the second kind with separable kernel by following a certain procedure, we will obtain asystem of linear equations that can be used to solve the local fractional fredholm integral equation, also the work displays examples that show the effectiveness of this method.

Keywords: local fractional calculus, local fractional fredholm integral equation, separable kernel

Monotone B-spline Smoothing,

Yousef Atatrah / AAUJ/ Palestine

In this thesis, regression and smoothing spline approximations are used and compared for estimating the conditional mean and median functions. Major attention is directed towards shape constrained estimation. In many applications monotonicity is an integrated part of the regression functions $g(\cdot)$ being fitted. Monotonicity is obtained here free of charge in the sense that the constrained fits inherit the asymptotic properties of the unconstrained estimates. The main tool is the use of quadratic B-splines. Some simulation experiments have been undertaken to evaluate finite-sample performance of the presented monotone 'regression' and 'smoothing' spline estimators $\widehat{g}_r^*$ and $\widehat{g}_s^*$. The monotone estimator $\widehat{g}_{rearr}^*$ obtained by applying the modern rearrangement technique is used as a benchmark in various constrained (linear monotone, monotone concave and only monotone) scenarios, for different sample sizes. The resulting Mean Squared Error estimates indicate that $\widehat{g}_{rearr}^*$ is the winner only when the true regression function is linear monotone. The smoothing spline $\widehat{g}_s^*$ is superior in the other scenarios when it comes to estimate the regression mean. The regression spline $\widehat{g}_r^*$ seems to perform better than $\widehat{g}_s^*$ and $\widehat{g}_{rearr}^*$ when estimating the conditional median under the single monotonicity constraint. Practical guidelines to effect the necessary computations and comparisons of the different estimators are provided by making use of the R software.

Using Symmetries To Solve Some Difference Equations
Walaa Yassen
Birzeit University / Palestine

Abstract: We study symmetry method to solve some difference equations by determining Lie groups of symmetries. Then we use these groups to achieve successive reductions of order. If there are enough symmetries, the difference equations can be completely solved.

A Study on Some Applications of Subordinations for Certain Subclasses of Analytic Functions Defined by Linear Operator
Souhad Almasri and Jamal M. Shenan
Al Azhar University / Gaza / Palestine

Abstract : Using the Wright generalized hypergeometric function we introduce a new subclass of multivalent analytic functions. We study some properties of this subclass such as subordination and superordination properties convolution properties inequality properties and other interesting properties of this subclass are also investigated.

On the Problem of Outliers in Meta-Regression
Ali Abuzaid / Al Azhar University /Gaza, Palestine

Abstract: The statistical analysis of effect sizes obtained a large collections of empirical studies or simply the analysis of analyses is known as Meta – analysis. Similar to other types of data it is not uncommon to observe extreme effect size values when conducting a meta-analysis and the presence of outliers may affect the validity and strength of meta analysis results. Meta-regression is a tool used in meta-analysis to examine the impact of moderator variables on study effect size using regression-based techniques. There are few procedures to detect outliers were extended multiple regression. This paper proposes a new procedure for detecting suspicous outliers in meta-regression; based on the penalized maximum likelihood method with smoothly clipped absolute deviation SCAD penalty function. Parameter estimates are obtained by applying coordinate descent algorithm and the cross-validation criterion is used to determine the tunning parameter which controls the trade off between the likelihood and the penalty. The performance of the proposed method is examined and compared with other known proceduers via simulation. The results show that the proposed procedure out performs other procedures. For illustation purposes the proposed procedure is applied on a real data set of the effectiveness of writing-to-learn interventions on academic achievement based on 26 different studies. The results show a consistent performance of the proposed procedure with other procedures.

Ideals on Skew Lattices
Walaa Doufesh, Nureddin Rabie,
Palestine Polytechnic University,
Palestine

Abstract. In this work we discuss the concept of Skew Lattice which is an Algebraic Structure (S, $\wedge$, $\vee$) where $\wedge$ and $\vee$ are associative and idempotent binary operations satisfying the absorption identities . In general Skew Lattices are a non-commutative generalization of Lattices.
We also discuss the Green's Relations on these kinds of Lattices, and enrich the concepts of Skew ideals and filters on Skew Lattices.

Balance Manifolds of in Biological Systems
Stephen Baigent
University College London/ UK

Abstract : A balance manifold is a codimension-one attracting invariant manifold on which competing processes balance. We describe the general setting for such a manifold and give examples from biology where a balance manifold can be shown to exist by identification of a convex cone through which the models are competitive. In the ecological setting the manifold is known as the carrying simplex, and we comment on the relation of the curvature of this manifold to stability of populations. In population genetics model, the competing processes of selection and recombination balance on a perturbation of the standard `Hardy-Weinberg' manifold. Time permitting, we will also show that a balance manifold often exists when the model is not identifiably competitive.

A Bayesian Nonparametric Estimation to Entropy
Luai M S AL Labadi
University of Sharjah (UAE) / California State University, Northridge

Abstract : A Bayesian nonparametric estimator to entropy is proposed. The derivation of the new estimator relies on using the Dirichlet process and adapting the well-known frequentist estimators of Vasicek (1976) and Ebrahimi, Pflughoeft and Soofi (1994). Several theoretical properties, such as consistency, of the proposed estimator are obtained. The quality of the proposed estimator has been investigated through several examples, in which it exhibits excellent performance.

On Boundary Control of the Poisson Equation with the Third Boundary Condition
Amjad Tuffaha
American University of Sharjah/ UAE

Abstract : This paper studies controllability of the Poisson equation on the unit disk in the complex plane subject to the third boundary condition when the control is imposed on the boundary. We use complex analytic methods to prove existence and uniqueness of the control when the parameter λ is a nonzero complex number but not a negative integer not an eigenvalue. Otherwise due to multiplicity of solutions to the underlying problem when λ is a negative integer controllability could only be obtained if proper additional conditions on the boundary are imposed.

Geometry of Turbulent Flows and the 3D Navier-Stokes Regularity Problem, Aseel Farhat
University of Virginia / USA

Abstract : We describe several aspects of an analytic/geometric framework for the three-morphology of the regions of intense vorticity/velocity gradients observed in computational simulations of three-dimensional turbulence.

Binary Operations on Matrices of Graphs
Iyad Alhribat, Maryam Fasfous
PPU /Palestine

Abstract. In this paper, we study a new finite simple graph G that is constructed from two finite simple graphs G_1 and G_2 with $V(G_1)=V(G_2)$ by applying the Boolean operations $\vee, \wedge, \oplus$, and $\bar{\oplus}$ on their antiadjecency matrices.

In addition, we compare the largest eigenvalue of antiadjecency matrices that is constructed by these Boolean operations.

Furthermore, we present a new ring structure consisting of the antiadjecency matrices of finite simple graphs.

Key words: Graph, antiadjecency matrix, Boolean operation.

Exact Solutions to An Optimal Control Problem for An Ornstein-Uhlenbeck Process with Random Parameters

Mario Lefebvre ,Abderrazak Moutassim
Polytechnique Montreal/ Canada

Let $\{X(t), t \geq 0\}$ be an Ornstein-Uhlenbeck process and $\{Y(t), t \geq 0\}$ be a continuous-time Markov chain with state space $E = \{1, \ldots, k\}$. The Markov chain spends a random exponential time with parameter ν_i in state i before making a transition to state $j \neq i$ with probability p_{ij}. We consider the controlled process $\{(X(t), Y(t)), t \geq 0\}$ defined by the stochastic differential equation

$$dX(t) = -\alpha_{Y(t)} X(t)\, dt + b_0\, u[X(t), Y(t)]\, dt + \sigma_{Y(t)}\, dW(t),$$

where $b_0 \neq 0$ is a constant, $\alpha_{Y(t)}$ and $\sigma_{Y(t)}$ are positive, and $\{W(t), t \geq 0\}$ is a standard Brownian motion. We want to find the control that minimizes the expected value of the cost function

$$J(x, i) := \int_0^{T(x,i)} \left\{ \frac{1}{2} q_0\, u^2[X(t), i] + \lambda_i \right\} dt + K_i,$$

where q_0 and λ_i are positive constants, $K_i \in \mathbb{R}$ and $T(x, i)$ is a random variable defined by

$$T(x, i) = \inf\{t \geq 0 : X(t) = a \text{ or } b \mid X(0) = x \in [a, b], Y(0) = i\},$$

for $i = 1, \ldots, k$. Thus, the optimizer wants the controlled process to leave the interval $[a, b]$ as soon as possible, while taking the quadratic control costs into account. This type of problem is called "LQG homing".

Let

$$F(x, i) := \inf_{u[X(t),i],\ 0 \leq t \leq T(x,i)} E[J(x, i)]$$

for $i = 1, \ldots, k$. Using dynamic programming, we find that the optimal control can be expressed as

$$u^*(x, i) = -\frac{b_0}{q_0} F'(x, i)$$

and that the functions $F(x, i)$ satisfy the system of non-linear second-order differential-difference equations

$$\begin{aligned} 0 &= \lambda_i - \alpha_i\, x\, F'(x, i) - \frac{1}{2} \frac{b_0^2}{q_0} [F'(x, i)]^2 + \frac{1}{2} \sigma_i F''(x, i) \\ &\quad + \sum_{j \neq i} \nu_i p_{ij} [F(x, j) - F(x, i)]. \end{aligned} \tag{1}$$

The boundary conditions are $F(a, i) = F(b, i) = K_i$ for $i = 1, \ldots, k$.

We will show that in the case when $E = \{1, 2\}$, it is sometimes possible to obtain an exact solution to the above system by assuming that

$$\begin{aligned} F(x, 1) &= a_2\, x^2 + a_0, \\ F(x, 2) &= b_2\, x^2 + b_0. \end{aligned}$$

A Method for Estimating Size of Palestinian Population in West Bank and Gaza Strip with Application to PCBC Census Data

Adnan A
An Najah National University / Palestine

Abstract : A mathematical model for estimating of the population size of West Bank and Gaza Strip is re-proposed. This model was first proposed in 1996 when there were no national independent or reliable census was conducted. Later two Palestinian-mobilized censuses were conducted in the above mentioned Palestinian areas; that is of 1996 and that 0f 2017. Applying our same model showed a great deal of agreement with the resulting figures of the two executed censuses in the same two areas; by PCBS. Testing of our model on accurate demographic data shows its reliability and thus its validity.

Bayesian Model for Estimating Patients Demand Progression,

Inad Nawaja
Hebron University/ Palestine.

Abstract : Home Care HC service consists of providing care to patients at their own home without the necessity of bringing them to hospitals or nursing homes. This service allows a high quality of life for the assisted patients and at the same time a cost reduction for the health care system. Planning human resources is a difficult task and for a good quality of planning a knowledge of future demands for visits patients is required. In the literature several studies deal with stochastic models for representing patient conditions in health care systems but to the best of our knowledge few works deal with HC service and Bayesian approaches have not been considered in the HC context yet. The aim of this paper is to propose a methodology for estimating and predicting the demand for care by HC patients in terms of number of visits N required in a defined time slot. Patients are characterized by a Care Profile CP which varies along with the time secondary to a periodic revision or sudden variations in health state. Our approach considers the joint distribution of N and CP over time as a conditional distribution of N given CP times the marginal of the CP; in addition the transition between CPs is regulated by a non homogeneous multistate Markov Chain. The proposed model is developed and validated considering the data of one of the largest HC providers in Italy. We obtain the posterior densities of model parameters through MCMC

simulation and predict the number of visits patients in future time slots. Results show the applicability of the approach in the practice and a good quality of the predicted number of visits.

Advances in Fitting Concentric Objects to Digitized Data
Ali Al-Sharasqah
Northridge / USA

Abstract : Various objects appear concentric in images. Examples include a compact disk an iris and the cross-section of a transmission pipe. Perhaps the simplest concentric pattern is formed by circles that have a common center. A set of concentric circles is characterized by the center and the radii. The estimation of the concentric circle parameters is a challenging problem due to the nonlinear relationship between the observed data points and the unknown parameters. It has been an active research and has many applications in biometrics such as iris recognition commercial electronics i.e. camera calibration and industry steel coils quality control.

Many concentric circle estimators been developed over the years including the preliminary solution by Dampegama the suboptimum method by Benko the conic fitting solution by OLeary and the algebraic solution by Ma and Ho. Recently Al-Sharadqah and Ho 2015 have revisited previously proposed methods and developed new ones for the problem of fitting concentric circles. Both algebraic and iterative methods were investigated and the first-order analysis were performed. The analytical results indicate that the algebraic solutions are easy to apply but the performance is suboptimum. The iterative solutions namely the maximum likelihood estimator MLE the gradient weighted algebraic fit GRAF and the Renormalization method RM can yield the KCR bound performance. Furthermore the MLE using the Levenberg --Marquardt implementation is much more computationally efficient than the GRAF and the RM. Under the first order analysis these estimators all have zero bias.

The first order analysis is appropriate when the signal-to-noise ratio SNR of the measurements is high so that the bias is negligible compared to variance. It is not uncommon in many practical scenarios where the SNR is not sufficient. In such cases the first order analysis will not be a reasonable indication in predicting the performance of an estimator. The first order analysis also is not adequate to explain the behaviors of different estimators. This work extends the previous study to perform the second order analysis and evaluate the estimation bias of several concentric circle estimators. The second-order analysis exposes important characteristics of the estimators that cannot be seen the first order studies. The insights gained in the theoretical study has led to the development of a new estimator that is unbiased and performs best among the algebraic solutions. An adjusted Maximum Likelihood estimator is also proposed that can yield an unbiased estimate while maintaining the KCR bound performance.

Breaking the F-barrier: How the use of a visual representation of Fisher's F-ratio can aid student comprehension of orthodox statistics
Rory Allen,
Goldsmiths University of London / UK

Abstract: Significance testing using Fisher's F is central to much of conventional statistical practice in the social and biological sciences. However students often find the rationale for using the F-ratio hard to grasp. This difficulty can be a real deterrent to students enrolling in scientifically oriented courses which require a statistical component.
This paper explains how orthodox statistics

can be presented using a single diagram in which measures of goodness of fit and model complexity are used to compare null and alternative models. In this diagram the F-ratio can be represented as the ratio of the slopes of two lines and it is immediately clear the layout why high F-ratios correspond to desirable alternative models. I argue that this gives students a deeper insight into the purpose and usefulness of statistical methods. This presentation also gives an intuitively appealing explanation of the R-squared measure of effect size and leads to a simple geometric demonstration of how and why the formula needs to be changed to derive its unbiassed counterpart adjusted R-squared.

Determinants of Students Success at Birzeit university
Hassan Abu Hassan
Birzeit University / Palestine

Abstract : This talk explores determinants of academic performance among university students in Bir Zeit University. A stratified random sample of 400 undergraduate students in in Bir Zeit University will be surveyed using a self-administered questionnaire; the survey will be conducted in the spring semester 2018.
Both factor analysis and generalized linear regression model will be used variables like gender entrance test General High School Test psychological well-being classes attendance and other factors will be tested to determine their effect on academic performance.
This is the first study of this type conducted in Bir Zeit University; therefore the results contribute to the research literature on students' well-being and academic performance through increased understanding of the determinants of both response variables. University administration academic advisors counselors and community health professionals will be better equipped to design interventions aiming at improving students academic performance and enhancing their social well-being.

Keywords: University students psychological well-being academic performance higher education

Estimating Variance-Mean Mixtures of Normals
Hasan Hamdan
James Madison University / USA

Abstract: A new semi-nonparametric method for modeling data with Normal variance-mean mixture is presented. This new method is based on a least-squares programing routine. Density estimates based a random sample of size n using this method which is called NVMM are compared with estimates based on the EM Algorithm and with estimates based on the the Bayesian approach. The comparison are done using real-life and simulated examples. The results are promising and has great potential for improvement.

Geometric Approaches and Bifurcations in the Dichotomous Decision Model
Abdelrahim Mousa
Birzeit University / Palestine

Abstract: Resorting to the Dichotomous decision model where individuals can make alternative decisions we study two geometric approaches to construct all possible decisions tiling. Each decision tiling indicates the way the Nash equilibria co-exist and change with the relative decision preferences of the individuals. We find the Nash domains for the pure and mixed strategies and characterize the space of all parameters where the pure

Nash equilibria are either cohesive or disparate. We show how the coordinates of the influence matrix together with the total number of individuals affect significantly the occurrence of bifurcations with and without overlaps between the pure strategies.

Kinetic Adsorption Model with Freundlich Equilibrium

Maher Al Jabari , Nareman Zahdeh /
PPU / Palestine

Abstract : This paper presents a new kinetic adsorption model developed for batch physical adsorption process. The model is applicable to wastewater treatment processes when equilibrium at the interface is governed by freundlich isotherm. This is the case with the adsorption of organic pollutants onto soil particles. The modeled is obtained from differential mass balance, together with the general mass transfer rate equation, combined with freundlich isotherm. The results are obtained from the numerical solution of two ordinary differential equations. The obtained adsorption curves are presented in a simple form of fractional removal of pollutant as a function of dimensionless time. Effects of the model parameters on the fraction removal of pollutants is investigated.
Keywords: Freundlich, kinetic,modeling, adsorption, wastewater.

Dynamics and Bifurcation of Second Order Rational Difference Equations

Batool Raddad, Mohammad Saleh
Birzeit University / Palestine

Abstract:
The main goal of this talk is to study the bifurcation of second and third order rational differenc equations. We consider the sufficient conditions for the existence of the bifurcation.
We study the second order rational difference equation

$$x_{n+1} = \frac{\alpha + \beta x_{n-1}}{A + Bx_n + Cx_{n-1}}, \quad n = 0, 1, 2, \ldots$$

with positive parameters α, β, A, B, C and non-negative initial conditions $\{x_{-k}, x_{-k+1}, \ldots, x_0\}$. W study the dynamic behavior and the direction of the bifurcation of the period-two cycle. Then, w give numerical discussion with figures to support our results. Also we study the third order rationa difference equation

$$x_{n+1} = \frac{\alpha + \beta x_{n-2}}{A + Bx_n + Cx_{n-2}}, \quad n = 0, 1, 2, \ldots$$

with positive parameters α, β, A, B, C and non-negative initial conditions $\{x_{-k}, x_{-k+1}, \ldots, x_0\}$. W study the dynamic behavior and the direction of the Neimark-Sacker bifurcation. Then, we giv numerical discussion with figures to support our results

Strongly N-Absorbing Ideals in Commutative Rings and Related Topics

Iba'a Maghari , Mohammad Saleh

Birzeit University / Palestine

Abstract:
Let R be a commutative ring with $1 \neq 0$, and n a positive integer. In this research we investigate three different generalizations of prime ideals. Firstly, a proper ideal I is a strongly n-absorbing ideal if whenever $I_1 I_2 ... I_{n+1} \subseteq I$, there are n of the I_i's whose product is a subset of I. We study some of its basic properties and prove that the radical of a strongly n-absorbing ideal, the intersection of n prime ideals and the product of n maximal ideals are all strongly n-absorbing ideals. Secondly, we study some properties of n-absorbing primary ideals. A proper ideal I of a ring R is an n-absorbing primary ideal if whenever $x_1 x_2 ... x_{n+1} \in$I, then a product of n of them belongs to either I [5]. Among other results in this research, we prove that an n-absorbing primary ideal has at most n minimal prime ideals and if I_j is a P_j-primary ideal for $j = 1, 2, ..., n$, then the product and the intersection of the I_js s are both n-absorbing primary ideals. Finally, we introduce the notion of classical n-absorbing submodule, and investigate some of its properties. A proper submodule K of an R-module M is called a classical n-absorbing submodule if whenever $r_1, r_2, ..., r_{n+1} \in R$ and $m \in M$ with $r_1 \cdots r_{n+1} m \in K$, the product of n of the r_is with m is in K for $i = 1, 2, ..., n$.

Fast Computation of n×n Matrix Retrieval based on Asserted Constant Rules

Saleh Salous
PTUK / Palestine

Abstract: This paper presents an acceleration for matrix data retrieval. We make novel by considering the idea of how to inquire the data of n×n matrices based on asserted constants. The proposed solution is an algorithm which includes three unique variable numbers: Matrix determinant First row elements and the eigenvalues. The outcomes of this paper help in various areas in the fields of mathematics and physics computing such as improve data encryption algorithms faster-sending matrices via networks and decreases data storage etc.

Numerical Radius Inequalities for Operator Matrices

Fuad Kittaneh
Jordan University/ Jordan

Abstract: In this talk we present several numerical radius inequalities for operator matrices. Applications of these inequalities are given to obtain new estimates for the numerical radius of the Frobenius companion matrix. Bounds for the zeros of polynomials are also given.

Numerical Schemes for Solving Volterra Integral Equation with Carleman Kernel

Wala Draidi and Naji Qatanani
An-Najah National University / Palestine

Abstract: Three numerical schemes, namely: Toeplitz Matrix method, Product Nystrom method and Sinc-Collocation method have been proposed and implemented to give an approximate solution of the linear Volterra integral equation of the second kind with Carleman kernel. To display the validity and acceptability of the numerical methods, two illustrative examples with known exact solution are presented. Numerical results show clearly that the convergence and accuracy of these schemes are in a good agreement with the exact solution. Moreover, it is worth pointing out that the Nystrom and Toeplitz matrix schemes are more efficient in comparison with the sinc-collocation method.

A Novel Method for Determining the Rank of a Matrix

Ayed Abdel Ghani
PPU / Palestine

Abstract An *n*-by-*m*Cauchon diagram *C* is an *n*-by-*m* grid consisting of *n·m* squares colored black and white, where each black square has the property that every square to its left (in the same row) or every square above it (in the same column) is black. Let *A*=(*aij*) be an *n*-by-*m* matrix and *C* an*n*-by-*m*Cauchon diagram. Then we say that *A* is a Cauchon matrix associated with the Cauchon diagram *C* if for all (*i*,*j*)∈{1,…,*n*}×{1,…,*m*}, we have a_{ij} =0 if and only if the corresponding square (*i*,*j*) in *C* is black. In this talk, we present a novel method for the determination of the rank of a matrix *A* and for checking a set of its consecutive row (or column) vectors for linear independence provided that the resulting matrix of the application of the condensed form of the Cauchon algorithm to *A*, see, e.g., [2], is a Cauchon matrix. This method is also linked to the elementary bidiagonal factorization of a matrix under certain conditions [1].
This is joint work with Mohammad Adm (University of Konstanz, Konstanz, Germany and Palestine Polytechnic University, Hebron, Palestine) Khawla Al Muhtaseb (Palestine Polytechnic University, Hebron, Palestine), Shaun M. Fallat (University of Regina, Regina, Canada), and JuergenGarloff (University of Applied Sciences / HTWG Konstanz, and University of Konstanz, Konstanz, Germany).

Generating Arithmetic Progressions Among Squares by Using Vector Space

Muneer Karama
PPU / Palestine

Abstract : The aim of this paper is to find new method of generating Arithmetic Progressions AP among square by using algebraic method i.e. by using vector space.

In 2016 [1] it is possible to produce Arithmetic Progressions AP positive integers so that a2 b2 c2 are in AP such that : b2 – a2 = c2 – b2 .
In 2008 [2] Peth’o and Ziegler have found an arithmetic progression of length 4 that lies on some curve X2 − dY2 ¬ = m and they have found an arithmetic progression such that there does not exist such a curve. In 2010 [1] Enrique Gonz and J. ÃDorn Steuding gave a partial answer to this question: Let ˇ d be a squarefree integer. Does there exist four squares in arithmetic progression over Q √ d depending on the value of d? In the affirmative case they construct explicit arithmetic progressions consisting of four squares over Q √ d.

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Recent Applications of the Cauchon Algorithm to Intervals of Totally Nonnegative Matrices

Khawla Almuhtaseb
PPU / Palestine

A real matrix is called *totally nonnegative* if all its minors are nonnegative. The set of the real n-by-m matrices can be endowed with the *checkerboard partial ordering* as follows: for $A=(a_{ij})$, $B=(b_{ij}) \in R^{n,m}$

$$A \leq^{*} B : \Leftrightarrow (-1)^{i+j} a_{ij} \leq (-1)^{i+j} b_{ij},\ i=1, \ldots, n,\ j=1, \ldots, m.$$

The *matrix intervals* with respect to this partial ordering are the set of all n-by-m matrices which lie between any n-by-m matrices A and B with respect to this partial ordering; herein the matrices A and B *are* called the *corner matrices*. The Cauchon Algorithm, see, e.g., [3], has been applied successfully in [1] to settle the so-called Garloff's Conjecture [2]. This conjecture states that the matrix interval is nonsingular and totally nonnegative if the two corners are so.
In this talk we report on some recent applications of the Cauchon Algorithm to the investigation of the interval property of totally nonnegative matrices when relaxing the nonsingularity assumption.

This is joint work with Mohammad Adm (University of Konstanz, Konstanz, Germany, and Palestine Polytechnic University, Hebron, Palestine) Ayed Abdel Ghani (Palestine Polytechnic University, Hebron, Palestine), and Juergen Garloff (University of Applied Sciences / HTWG Konstanz, and University of Konstanz, Konstanz, Germany).

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Physics Talks

Spin-Polarized Ttransmission Through Correlated Heterostructures

Ulrich Eckern
University of Augsburg,
Germany

Abstract : A novel method for computing the transmission through correlated heterostructures is proposed by combining density functional and many-body dynamical mean field theory DFT and DMFT respectively. Using this combination we study the effects of local electronic interactions and finite temperatures on the transmission across a half-metallic NiMnSbn layer coupled to Au leads [1]. For n = 1 and within DFT-LSDA the transmission function displays a spin polarization of around 50% in a window of 1 eV around the Fermi level. By increasing n an almost complete transmission spin polarization is achieved. Supplementing the DFT-LSDA calculations with local electronic interactions of Hubbard-type on the Mn sites we find a strong hybridization between interface and many-body states. The significant reduction of the spin polarization seen in the density of states is not apparent in the spin polarization of the transmission which suggests that the hybridized interface and many-body induced states are localized.

Is Al-Quds a Crystal or a Liquid? – Urban Physics for Resilience and Sustainability of Cities,

Franz-Josef Ulm,
MIT University / USA

Abstract : By the year 2050, 6.7 billion people are expected to be living in urban environments. We are going to face the challenge of expanding the global urban network by approximately what is equivalent to 8-9 cities of New York, NY each year! The sustainable development of our urban network thus requires new quantitative approaches that can deal with cities' multiple complexities. These complexities are recognized to be much akin to molecular structures for which tools of statistical physics provides a wealth of quantitative tools to quantify city geometry and improve infrastructure performance while minimizing our environmental footprint and maximizing the resilience of our cities' building stock,– a true multi scale task, specifically as we face the perils of global warming.

On The Dynamics of Transition of a Classical System to Equilibrium state

Sami Aljaber,
An Najah National University,
Palestine.

Abstract : In this work we consider a spring with one end is fixed and the other is connected to a block of mass M located on a horizontal rough table. The other side of the block is connected to a massless rope that passes over a frictionless pulley at the end of the table and a second block of mass m is hanged at the rope's other end. For this system we analyze and discuss its dynamics of motion as function of time when the second block is released. In particular the displacement of the system at the end of each half-cycle of motion the total distance and the work done against friction are derived. An interesting result is obtained for the case when the table is frictionless. It is found that there is still a work done by friction whose magnitude is exactly the same as the stored energy in the spring.

Hexavalent Ions Sorption on Bentonite Clay

Zeid N. Qamhieh[1] Loay A. Manasrah[1] and Khawla N. Qamhieh[2]
[1] Physics Department An-Najah National University Nablus – Palestine
[2] Physics Department Al-Quds University Alquds- Palestine

Abstract : Radioactive ions represent a potential threat to the environment and humans especially via polluting and contaminating ground water. However protection removal and recovery of such pollutants represent an important issue of special interest. One effective method used for heavy metal removal aqueous solutions is the adsorption of pollutants on a solid matrix [1]. A

strong alternative is the SKB Swedish Nuclear Fuel and Waste Management Co. by which nuclear waste is put into copper containers embedded in bentonite and placed underground [2].

This work deals with the retention of hexavalent pollutants in mineral layers bentonite. The sorption of trivalent M3 and tetravalent M4 [3] in addition to pentavalent M5 [4] radioactive pollutants sea and ground water on bentonite have been studied under various conditions using Grand canonical Monto Carlo simulation [5]. The average electrical double layer concentration and the retention coefficient of multivalent cations in the aqueous solution were calculated as a function of multivalent cation concentration the temperature of the system the surface charge density of the clay electrical double layer and the ionic strength of the solution.

The results of this study indicate that the sorption behavior of hexavalent cations is strongly influenced by the above mentioned parameters. The average electrical double layer concentration of hexavalent cations was found to increase by increasing the bulk hexavalent concentration and the surface charge density. However this average concentration was found to decrease by increasing the ionic strength. The retention coefficient of hexavalent cations tends to increase by increasing the surface charge density although it becomes less by increasing the hexavalent concentration in the bulk and by increasing the ionic strength of the solution. Moreover the average concentration and the retention coefficient of hexavalent cations were found to decrease very slightly with increasing the temperature. All these results show an obvious enhancement of the retention capacity of the bentonite system which proves that bentonites are very suitable sorbents for recovery and sorption of multivalent especially hexavalent radioactive pollutants different aqueous solutions such as ground water.

Transport in Clean and Disordered Quantum Wires: KKZ Criticallity and Creepy Flows.
Ferdinand Evers
University of Regensburg / Germany

Abstract: Interacting quantum wires have fascinating transport properties. In this talk we will address two specific aspects. a Clean spin-chains of the XXZ-type exhibit at weak transverse fields a ballistic phase that becomes diffusive above a critical field strength. Numerical evidence will be provided giving rise to a surprising observation: the critical point separating these phases is of the Kadar-Parisi-Zhang type. b In its strongly disordered variant the model serves as a paradigm for a recently discovered phenomenon the many-body-localization. Our numerical investigations indicate that the localized phase exhibits a very slow dynamics \creep\" which could imply an unbound growth of the width of the diffusion propagator. In this case the phase formerly identified as \"localized\" would exhibit an infinite localization length.

Stable Nano-Film Electrodes with High Solar Energy Conversion by Charge Transfer Catalysis
Hikmat Hilal and Ahed Zyoud
An Najah Universirty
Palestine

Abstract: Attachment of electro-active species to the surface of a given semiconductor SC electrode permanently affects its photo-electrochemical PEC properties. Depending on the charge of the electro-active species the flat band potentials may be shifted up more negative or down more positive. The shift value depends on the applied ion charge density at the surface. Up to 300 mV shifting has been achieved here. Moreover the electro-active species behaves as charge transfer catalyst across the electrode/redox junction. This increases the charge holes or electrons depending on the type of the SC transfer rate between the SC electrode and the redox couple. By doing so the SC electrode can become more stable to photo-corrosion. All such advantages can be gained simply by attaching the proper electro-active

materials to the proper SC electrode. The attachment can be performed by either chemical linkage or more recently by embedding the electro-active material inside a polymer matrix. The new technique has been successfully applied to monolithic and to polycrystalline SC electrode systems. Monolithic n-GaAs electrode showed up to eight fold enhancement in conversion efficiency. Polycrystalline film electrodes involving nano-particles of semiconductors CuS CuSe CdSe CdTe and others are are globally known to be unstable and yield low conversion efficiency in the order of 1.0% or less under PEC conditions. Stability and efficiency of such new types of electrodes have been enhanced here by the new technique. Conversion efficiency values of 4.4 8.0 15.0% and 18.0% have been observed CdSe CdTe CuS and CuSe film electrodes respectively. Such values have not been reported for pristine metal chalcogenide film electrodes before. This presentation will show a critical survey of our results observed throughout the last 15 years as compared to other literature. The new model proposed for the efficiency and stability enhancement will also be rigorously presented. Future prospects of this work will also be discussed.

Transport Mechanisms in CdS/Sb_2Te_3 Tunneling Heterojunction Devices
Atef Qasrawi
AAUJ Palestine

Abstract : In the current work, a tunneling barrier device made of 20 nm thick Sb_2Te_3 layer deposited onto 500 nm thick CdS is designed and characterized. The design included a Yb metallic substrate and Ag point contact of area of 10−3 cm^2. The heterojunction properties are investigated by means of x-ray diffraction and impedance spectroscopy techniques. It is observed that the coating of the Sb_2Te_3 onto the surface of CdS causes a further deformation to the already strained structure of hexagonal CdS. The designed energy band diagram for the CdS/Sb_2Te_3 suggests a straddling type of heterojunction with an estimated conduction and valence band offsets of 0.35 and 1.74 eV, respectively. In addition, the analysis of the capacitance-voltage characteristic curve revealed a depletion region width of 14 nm.
On the other hand, the capacitance and conductivity spectra which are analyzed in the frequency domain of 0.001–1.80 GHz indicated that the conduction in the device is dominated by the quantum mechanical tunneling in the region below 0.26 GHz and by the correlated barrier hopping in the remaining region. While the modeling of the conductivity spectra allowed investigation of the density of states near Fermi levels and an average scattering time of 1.0 ns, the capacitance spectra exhibited resonance at 0.26 GHz followed by negative differential capacitance effect in the frequency domain of 0.26–1.8 GHz. Furthermore, the evaluation of the impedance and reflection coefficient spectra indicated the usability of these devices as wide range low pass filters with ideal values of voltage standing wave ratios.

Two-Point Resistance on the Infinite Square Network.
Jihad Asad,
Palestine Technical University-Kadoorie, PTUK / Palestine.

Abstract : The resistance between the origin and any other lattice point in an infinite square lattice consisting of equal resistors each of resistance is determined using the lattice Green function LGF method. It is shown that the two-point resistance on the infinite square lattice is expressed in terms of the LGF at the two lattice sites as:
Morita derived some recurrence formulae for the LGF of the infinite square lattice. Based on these relations we obtained four recurrence formulae for the resistance.
Some exact values for the resistance between the origin and any other lattice point are presented. Experimental results have been presented and a comparison is carried out between experimental and theoretical results. Finally for large separation between lattice points the asymptotic forms of the resistance are calculated.

Distributed Reinforcement Learning Algorithms for Resource Allocation in Energy Harvesting Sensor Networks

Hanan Al-Tous and Imad Barhumi
UAEU /United Arab Emirates UAE

Abstract : Wireless-sensor-networks WSNs are autonomous networks of distributed sensor nodes that are communicating with each other wirelessly in a multi-hop fashion. WSNs are the main building structures of the internet-of-things IoT paradigm which is considered the next revolution wire-less communication system. Energy-harvesting EH sensor nodes can be deployed in inaccessiblelocations and have the potential to overcome the battery size constraints in WSNs and make green communications possible. Resource allocation problems in EH-WSN are sequential decision-making
problems under uncertainty can be modeled as Markov-decision-problems MDPs where the underlying probability structure can be approximated by a Markov chain. MDPs may be solved using classical dynamic-programming DP methods. However DP methods suffer the curse of dimensionality and break down rapidly in face of large state spaces. In addition DP methods requirethe exact computation of the transition probabilities which are often hard to obtain and are hence
suffer the curse of modeling as well. Reinforcement learning RL algorithms to a great ex-tent alleviate DP curses by generating near-optimal solutions to problems having large or infinite state-spaces and complex transition models
In this paper our goal is to develop a learning algorithm that adaptively changes the transmitted data and power allocation according to the traffic load available energy and channel gains such that the data of all sensor nodes are received at the sink node with minimum delay. In this sense a distributed RL algorithm is proposed to efficiently transmit the data of all sensor nodes based onthe distributed-state-action-reward-state-action D-SARSA algorithm with a linear action-value-function approximation. Simulation results demonstrate the merits of the proposed approach.

Towards Aerosol Analysis at the PIXE-RBS Beamline in the University of Jordan Van de Graaff Accelerator JUVAC.

Hanan Saadeh .
Jordan University / Jordan.

Abstract : The University of Jordan Van de Graaff Accelerator JUVAC was devoted many years ago to promote scientific research through the installation of several beamlines based on nuclear techniques. It constitutes the first and unique till now ion beam analysis IBA facility in Jordan. Among these techniques the JUVAC has recently installed with the financial and technical aid of the International Atomic Energy Agency IAEA a combination of particle-induced X-ray emission PIXE and Rutherford backscattering spectrometry RBS. A new X-ray detector has been installed and the system has been optimized for aerosol analysis using a set of thin MicroMatter standards and GUPIX software. This contribution includes a brief description of the combined PIXE-RBS beamline with some results particularly those obtained by PIXE.

Preparation and Characterization of Bone Scaffold

Mazen Alshaaer,
Prince Sattam Bin Abdul-Aziz University ,SA

Abstract : Scaffolds can serve as templates for cell attachment, differentiation and vascularization in vivo, and can then degrade and be replaced by new bone. Calcium phosphate (CaP) scaffolds mimic bone mineral and can bond to bone to form a functional interface. Injectable load bearing calcium phosphate scaffolds are synthesized using rod-like mannitol grains as porogen. Degradable injectable strong porous scaffolds, prepared by calcium phosphate cement represent a valid solution to achieving adequate porosity requirements while providing adequate support in loadbearing applications. This proposed process for preparing porous injectable scaffolds is as quick and versatile as conventional technologies. Using this method, porous CDHA-based calcium phosphate with macropores sizes range of 70 to 300μm, micropores from 5 to 30 μm, and 30% open macroporosity was prepared. The setting

time of the prepared calcium phosphate cement (CPC) was 15 minutes. The compressive strength and the e-modulus of the porous hydroxyapatite-based calcium phosphate samples, 4.9 MPa and 400 MPa respectively, were comparable with those of the cancellous bone. Finally, the bioactivity of the scaffolds was confirmed by cells growth with cytoplasmic extensions in the scaffolds in culture, demonstrating that the scaffold has a potential for MSC seeding and growth architecture. This combination of an interconnected macroporous structure with pore size suitable for the promotion of cell seeding and proliferation, plus adequate mechanical features, represents a porous scaffold which is a promising candidate for bone tissue engineering.

Measurements of ^{40}K Radioactive Isotope of Potassium in Soil Using Gamma Ray Spectroscopy

Nidal Dwaikat [a,b]

[a] Department of Physics, college of Science, King Fahd University of Petroleum & Minerals
[b]Radiation Physics Research Laboratory, King Fahd University of Petroleum & Minerals. Saudi Arabia

Abstract: A gamma ray spectroscopy technique has been used to determine the specific activity ofpotassium ^{40}K in soil samples taken from a zone close to building 28 at KFUPM campus. In our experiment,^{137}Cs and ^{60}Co standard sources have been used to calibrate a low-levelNaI(TI) detection system for gamma rays analysis of the soil samples. The samples were evident to contain ^{40}K concentrations with specific activity less than the international permissible value.

Multiple Excitations, Excited States, and Ultra Fast Charge Dynamics in Functional Materials: Theory Meets Experiments.

Talat S. Rahman,
University of Central Florida /USA

Abstract : These are exciting times in material science with experimental and computational advances making it possible to cross frontiers that were hitherto not possible. There are not only experimental observations of fascination optical properties of single and bilayer transition metal dichalcogenides (TMDs) such as the strongly bound excitons, trions and biexcitons (orders of magnitude higher than previously observed in semiconductors), but also a number of ultrafast pump-probe measurements that reveal the role that electron correlations may play in a variety of functional materials. Related to the above, I will present the results that we have obtained for several 2D materials and few other systems in which electron correlations are expected to play a role, using either time dependent density function theory (TDDFT) in the density matrix formulation, or DFT combined with dynamical mean field theory (DMFT), or a combination of TDDFT and DMFT. Of particular interest will be the excitation and emission spectra of the systems and their response to ultrafast probes.

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Binary and Ternary Mixtures of Eicosane with Fatty Alcohols and Fatty Acids as Phase Change Material for Building Applications.

Rabab Jarrar [1], Reyad Sawafta[2] , Yousef Haik[3,4]
[1]Physics Department, Faculty of Science, Palestine Technical University, Tulkarm, Palestine.
[2]QuarTek Corporation ,120 E Pritchard Street , Asheboro, NC 27203, USA.
[3]Hamad Bin Khalifa University,Qatar
[4]Center for Research Excellence in Nanobiosciences, University of North Carolina at Greensboro, Greensboro.

Abstract: Binary and ternary mixtures of eicosane ,fatty alcohol : Cetyl Alcohol (L16) and two fatty acids : Capric (CA) , Lauric (LA) acids were investigated by differential scanning calorimetry (DSC) . The eutectic mixtures of the binary systems were determined to be(85% eicosane – 15%L16) , (50% eicosane – 50% LA) and (50% eicosane – 50% CA) with melting temperature and latent heat of (33.93 ºC , 241J/g) , (30.63 ºC , 207.7J/g) and (24.86 ºC , 210 J/g) respectively .

The last one is very suitable for building applications. The eutectic mixture of eicosane with myristyl alcohol from previous work was used to prepare two ternary mixtures with both Cetyl Alcohol (L16) and Capric acid (CA) . An exciting results of temperatures were obtained : 26.86 ºC for first one and 16.23 ºC for the second one with moderate latent heats of 133.7 J/g and 157.7 J/g . These results will open the door to try ternary mixtures of common phase change materials to obtain various melting temperatures to suit different applications .

A Constraint Quaternion Extended Kalman Filter

Iyad Hashlamon / PPU / Palestine.

Abstract :In this paper we are proposing a constrained quaternion extended Kalman filter CQEKF. It is employed to estimate the quaternion states of a constrained nonlinear system perturbed by noise using noisy measurements. Further it preserves the quaternion unity norm constraint by projecting this norm onto the extended Kalman filter gain derivation. Then this gain is used to the quaternion vector keeping its norm constraint. The results show that the unity norm is preserved using the proposed CQEKF.

Formation of and Light Emission Silicon-Rich Silicon Oxide SRSO and Oxygen-Rich Silicon Oxide ORSO Doped with Er Tb or Ce: A Review.

Othman Zalloum / Palestine Polytechnic University, Palestine.

Over the past years we have been conducting extensive studies on achieving highly efficient light emission rare-earth doped silicon nanostructures formed in thin films prepared by ECR-PECVD. This review paper summarizes our studies of silicon-rich silicon oxide SRSO and oxygen-rich silicon oxide ORSO doped with Er Tb or Ce. We show successful in situ incorporation of high concentrations of rare-earth elements. The dependence of the emission properties on rare-earth dopant concentration silicon/oxygen ratio and annealing temperature are reviewed and summarized. The emission intensities the rare-earths were optimized. An interpretation of the excitation mechanisms and the correlation between optical properties and structural evolution is presented. The light emissions these films were very bright and can be easily observed even under room lighting conditions. Optimal film compositions and annealing conditions for maximizing the PL intensities of the rare earths in the films have been determined and will be presented.

Effective Field Theories and QCD Observables

Ahmad Idilbi
Palestine

Abstract: I will review the concept of Effective Field Theory in physics as a fundamental notion. In particular I will consider the theory of strong interactions namely Quantum Chromodynamics. I will discuss further its relevance to physical observables of current interest to the scientific community of high-energy physics.

Optimization Design of Solar Cell Based on Silver Nanoparticles

Kh. Kh. AbuShaar[1], M. M. Shabat[1], D. M. El-Amassi[1], and D. M. Schaadt[2]
[1]Physics Department, Islamic University of Gaza, Palestine
[2]Institute of Energy Research and Physical Technologies, Clausthal University of Technology, Leibnizstr. Clausthal-Zellerfeld, Germany.

Islamic University
Gaza, Palestine

Abstract: The development of solar cell has rapidly attracted research and industry. Solar cell is the device converting effectively the sun light into electric power. The concept of solar cell is based on getting higher light transmission and lower light reflection through the solar cell structure. A composite four-layer solar cell

structure containing SiN-Ag nanoparticles and SiO2 is designed and investigated. The transmission reflection and absorption of the incident light are derived by matrix method for different physical parameters of the structure and the numerical results are obtained by Maple program software. The effect of Ag nanoparticles on the proposed anti-reflective AR structure has effectively enhanced the transmission and improved the light efficiency.

Phase dynamics – Theory and applications

Aneta Stefanovska
Lancaster University / Lancaster, UK

Newton introduced dynamics to capture changes in the position of a particle in time. For oscillatory systems, the position is a phase within an orbit [1]. In closed or isolated systems, the frequency is usually considered as remaining constant, while in open systems, subject to external perturbations, the frequency can be changing in time. The changes can either be random (stochastic), or deterministic.

In trying to solve the three-body system, i.e. to describe trajectories of three objects in time, Poincaré introduced the concept of stability [2]. Instead of finding the solution for the trajectories, he proposed that one should investigate whether their motion is stable, unstable, or neutrally stable. Subsequent work led to chaotic dynamics which describes deterministic motion that is sensitively dependent on initial conditions [3].

However, chaotic dynamics usually considers only closed or isolated systems that can be described within the mathematical formalism of autonomous systems. There are many reasons for this. One of them is a widespread attitude that one can easily transform a non-autonomous system into an autonomous one. Another reason is that non-autonomous systems are difficult to treat [4], both with mathematical formalisms and in experimental conditions, and hence one has a strong motivation to accept the autonomous formalism as a good approximation [3].

In this talk we will present the state-of-the-art of the theory of time-varying oscillatory dynamical systems. We will argue that phase dynamics can provide a useful framework to treat externally perturbed dynamical systems in a complex environment. We will illustrate that perturbations of the amplitudes of oscillatory systems result in relatively simple changes, while perturbations of the phases can result in very rich behaviour. Moreover, time-varying changes in the phases of oscillatory systems can counterintuitively increase their stability [5]. This holds true for the simple case of two interacting systems, as well as for multi-dimensional phase oscillators. We will further illustrate that deterministic variation of phase dynamics can lead to a noise-like behaviour, and that this scenario can be used to formulate one of origins of noise.

In the final part of the talk we will show that phase dynamics with time-varying modulation can be used to model real-life systems, such as cell dynamics, the cardio-respiratory interaction, and the dynamics of brain waves. This will be illustrated based on real data. Methods [6-8] of analysing time-series form noisy, time-varying systems, such as time-frequency analysis using wavelets, phase coherence analysis, and analysis of time-varying coupling functions, will also be presented.

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Complex Potentials with Real Eigenvalues and The inverse Problem

Roland Lombard
IPN/ France

Abstract: The existence of complex potentials with real eigenvalues generates a number of interesting questions concerning the relations between a spectrum and its potential. The first one concerns the determination of the real equivalent potential. Secondly it brings a basic ambiguity : a real spectrum corresponding to a real potential may have an infinity of complex partners with the same spectrum. Typical examples and the impact on the physics will be presented and discussed.

Indoor Radon-222 Concentration Levels Measurements in Buildings at Palestine Technical University-Kadoorei

Karam Awawdeh, **Hussein Shanak**
PTUK / Palestine

Abstract: Radon concentration levels in the underground of buildings at Palestine Technical University -Kadoorei PTUK were measured during winter 2016. CR-39 track detectors were used in this study. These detectors were used as Solid-State Nuclear Track Detectors to identify the presence of ionizing radiation such as alpha particles. The indoor radon 222Rn concentration levels were found to vary 50 to 220 Bq/m3. The closed storages were found to have significant higher radon concentration levels than other places. The average indoor radon concentration was below their corresponding action level 149 Bq/m3 as recommended by Environmental Protection Agency EPA. In general most of the measurements were found to be within the range of the internationally accepted concentration levels of International Commission on Radiological Protection ICRP.

Electrostatic Interactions between, Cationic Dendrimers and Anionic Membrane,

Khawla Qamheyah
Al Quds University/ Palestine

Abstract : The plasma membrane is a dynamic structure of lipid bilayers and membrane proteins that both segregates the cytoplasm from the external medium and regulates the transport of matter into cells. Cationic nanoparticles such as dendrimers, have been shown to have the ability to penetrate cell membranes. In order to use the dendrimers for therapeutic and biotechnological applications, fundamental understanding of the

factors that control their membrane interactions is required.
The electrostatic interactions between cationic poly(amidoamine) (PAMAM) dendrimers of different generations, G3, G4, and G6, with net anionic model biomembranes have been predicted by adopting an analytical model for the electrostatic interaction between two dissimilar soft spheres. The influence of bilayer surface charge density, ionic strength, pH, temperature, thickness of the membrane, and size of dendrimer generation on the attractive interaction was investigated. It is found that the interaction is decreased by increasing salt concentration, dendrimer's chagre (pH), and thickness (or softness) of the membrane. Also the interaction is increased by increasing surface charge density of the membrane, and the size of dendrimer generation, where it is much larger with large generations, like G6 dendrimer which have a higher charge, than it is with small ones like G3 and G4 dendrimers.

Shape Evolution in Even-Even Nuclei with Z = 36-44 Isotopic Chains Using Covariant Density Functional Theory

Hazem Abu Sara / Birzeit University / Palestine

Abstract: The relativistic-Hartree-Bogoliubov formalism using density-dependent zero and finite range NN interactions and separable pairing is applied to the Kr isotopes Z = 36 and N = 34–64 isotopes neutron-rich SrZ = 38 ZrZ = 40 nuclei with neutron numbers N = 48–70 Mo Z = 42 nuclei with neutron number N = 50-66 and Ru Z = 44 nuclei with neutron number N = 52-68. A systematic search of triaxial ground state and the phenomena of unusual structural change and the coexistence of shape for 70-100Kr and at N = 58 in the 86-108Sr and 88-110Zr isotopes are done. In 92-108Mo and 96-112Ru are done Shape coexistence and triaxiality softness manifest themselves in a clear manner in Mo isotopes and only triaxiality softness is very clear in all of the Ru isotopes.

Synthesis Characterization and Optical Investigation of ZnO Nanorods

Ishaq Musaa[a] and Naser Qamhiehb[b]
[a]Department of Physics Palestine Technical University-Kadoorie
[b]Department of Physics UAE University Al-Ain ,United Arab Emirates.

Abstract: ZnO nanorods of controlled lengths were synthesized by chemical route method without surface modification. The morphology and structure of the nanorods were characterized by transmission electron microscopy Raman spectroscopy and X-ray diffraction. It was observed that the ZnO nanorods are hexagonal-shaped with diameters in the range of 16-20 nm and length up to 150 nm based on growth time reaction. Photoluminescence PL and UV–visible absorption measurements have been performed at room temperature. The PL spectrum showed that the relative intensity of ultraviolet UV and defects green band depend on the length of ZnO nanorods. The peak of photoluminescence of UV band around 395 nm is strongly enhanced when the length of ZnO nanorods is reduced and the green emission decreases.

Fluctuations in The resting Membrane Potential of Jurkat T Lymphocytes

Mahmoud Farout[1,2], Aleksandra Pidde[1,3], ShakilPatel[4], , Jane Owen-Lynch[4], Stephen Roberts[4],Aneta Stefanovska[1]
[1] Lancaster University, Physics Department, Lancaster, UK
[2] An-Najah National University, Physics Department, Nablus, Palestine.
[3]UniversitatPompeuFabra, Department of Information and communication, Barcelona, Spain.
[4] Lancaster University, Division of Biomedical and Life Science, Lancaster, UK

Abstract : All living cells are continuously regulating the intracellular concentrations of permeable ions to avoid osmotic stress and changes in a cell volume. Consequently, the membrane potential fluctuates around a certain

value, called resting membrane potential. While the resting membrane potential (V_m) was studied extensively in most cells, the fluctuations are mainly ignored and are usually considered as noise [1, 2]. However, if the opening and closing fluctuations were only random, the magnitude and dynamics of fluctuations in the resting membrane potential would not change deterministically. Some feedback regulation to amplify the fluctuation is already known [3]. In addition, it was proved that fluctuationsare not an artefact of the method but represent an intrinsic mechanism, asthe fluctuations in $V_m$wereabsent during ionomycin-induced hyperpolarization [4].
In our work, we aim to evaluate dynamical properties of these fluctuations, to correlate them with the behaviour of the cell, and establishhow they change with disease when the cell is not functioning well.
To the best of our knowledge, no one, to date, tried to study these fluctuations and the effects of altering the cell state on then.
Whole-cell patch-clamp method was used to record the resting membrane potential in jurkat T lymphocytes. In free-running (current-clamp) measurements (Fig1), voltage of the cell plasma membrane was recorded.

T**owards the Design Fabrication and Characterization of Hg_2 Sensors based on Graphite Oxide and Metalic**

Falah Awwad
UAEU / UAE

Abstract: It has been previously demonstrated that improving the detection of Mercury in water is of significant importance since Mercury has detrimental effects on human health and could lead to toxicity. One way this could be achieved is through the design of highly sensitive and ive sensors for Mercury Hg_2 contents in water. The main objective of this work to design and implement highly sensitive and ive sensors to detect mercury Hg_2 contents in water.

To achieve our goals several equipment are used in this work such as:
1- Thermal evaporation system Torr International evaporator.
2 - Ultra high vacuum compatible system which consist of deposition chamber source chamber and mass filter.
3- Computer-controlled Keithley 236 source-measuring unit.
4- Scanning Electron Microscopy SEM.
5- X-ray Powder Diffraction XRD and energy dispersive x-ray spectroscopy EDS.

Manipulating Properties of 2D Materials: Old Stuff with New Promises

Talat S. Rahman
University of Central Florida
USA

Abstract : Single-layer of molybdenum disulfide (MoS_2) and other transition metal dichalcogenides (TMDC) appear to be promising materials for next generation applications (optoelectronic and catalysis), because of their low-dimensionality and intrinsic direct band-gap which typically lies in the visible spectrum. MoS_2 is also known to be a leading hydrodesulphurization catalyst, for reasons that remain elusive. Efforts are underway to further tune these optoelectronic and catalytic properties through alloying, defects, doping, coupling to a substrate, and formation of bilayer stacks (homo- and hetero-structures). In this talk, I will present some results which provide a framework for manipulating the functionality of these interesting van der Waals materials. With regard to optical properties, I will present results of our analysis of the excitation spectrum and the ultrafast charge dynamics in both single- and bi-layer TMDCs obtained through the application of combined time-dependent density functional theory and many-body theory. In particular, I will show how the reduced electron screening in these systems leads to surprisingly large binding energy of excitons (hundreds of meVs), trions (tens of meVs) and biexcitons (tens of meVs), in rather good agreement with available experimental data. I will also show that ultrafast (10-100 fs) transfer processes are possible in these materials as a result of strongly-delocalized hole orbitals. With emphasis on the chemical properties of defect-laden single layer MoS_2 and *h*-BN, I will examine

modulations the local atomic environment under which these inert materials could serve as a catalyst for several technologically important reactions.

The Equation of State of Low and Intermediate Nuclear Matter with Low and Medium Clusters up to A =50

Rula Bakeer
Birzeit University / Palestine

Abstract: Nuclear matter at low and intermediate density and moderate temperature minimizes its energy by forming nuclear clusters. Most previous theoretical investigations ignored the formation of the heavy clusters and focused on light clusters with mass number up to A = 4. In this work clusters with mass number up to A = 50 are included in nuclear matter and treated by the Nuclear Statistical Equilibrium model NSE which states that clusters are in chemical equilibrium with the free nucleons in the surrounding vapour. The Nuclear Statistical Equilibrium NSE model was modified by using density-dependent binding energies of clusters where the clusters' binding energies decrease as the surrounding medium density increases. In fact clusters undergo the Mott transition and get dissolved as the density of nuclear matter increases due to the medium effects. The Pauli Blocking is found to be the prominent factor that affects clusters' binding energies. It was found that heavier clusters play a significant role in low and intermediate density symmetric nuclear matter composition and should be included in the equation of state EoS to make the study more realistic. Finally these clusters reduce the critical temperature by several MeVs.

The Effects of Magnetic and Electric Fields on Donor Impurity States in GaAs Quantum Dot

smaa Yaseen, Mohammad Elsaid , Musa Elhasan and khaled Illawi
An Najah University / Palestine

Abstract: The effects of magnetic and electric fields on the donor impurity states confined in a GaAs parabolic quantum dot has been studied. We have calculated The impurity energy and binding energy of the ground state and some low-lying excited states. The Hamiltonian was solved using 1/N expansion method within the effective mass approximation. The results had been displayed as a function of physical parameters: confinement strength ω_0 magnetic field strength ω_c and electric field strength F. In addition we have studied the magnetic properties of the donor impurity in the quantum dot by calculating the magnetization and the magnetic susceptibility.
We had investigated the dependence of the magnetization and the magnetic susceptibility quantities on temperature confinement strength ω_0 magnetic field ω_c and electric field strength F. The comparisons show that our results are in very good agreement with reported works.

Impedance Spectroscopy and Temperature Dependent Structural Properties of La-Doped $Bi_{1.5}Zn_{0.92}Nb_{1.5}O_{6.92}$ Pyrochlore Ceramics

Qotaiba Alkarem ,**Adli Saleh** ,**HazemKhanfar**
AAUJ/ Palestine

In this work, we explored some smart properties of the lanthanum doped $Bi_{1.5-X}La_XZn_{0.92}Nb_{1.5}O_{6.92}$ (La-BZN) pyrochlore ceramics. This was done because there are known applications for BZN high dielectric material. In this study, the La content denoted by (X) was varied in the range from 0.10 to 0.22. By increasing the La content from 0.10 to 0.20, a single phase appeared where the grain sizes increased from 33 to 57 nm respectively. Also, we explored temperature effects on the structural properties of the La-BZN in the temperature range of 298 to 470°K using the X-ray diffraction technique (XRD) for two samples with X= 0.10 and X= 0.20. The temperature dependent XRD analysis was employed to determine the temperature effects on the lattice constant, grain size, micro strain, dislocation density and degree of orientation.In addition, the room temperature impedance spectrumwas recorded in the frequency range from 10 to 1800 MHz. Physical

parameters of capacitance, conductance, reflection coefficient, return lossand voltage standing wave ratio that are needed for using the La-BZN as an active resonator in telecommunication technology were investigated. These measurements provided information about the doping effects on the dielectric properties in this frequency range.

Keywords: BZN, dielectric, mechanical, strain, impedance, return loss

Optical Conduction in CdS Nanosandwiched with Yb Metal

Tamara Abed and A. F. Qasrawi
AAUJ / Palestine

Abstract: In the current study the optical conduction parameters in CdS thin films nano sandwiched with 70 nm thin layer of ytterbium are investigated in the frequency domain of 270-1000 THz. The optical conductivity which was determined via dielectric analysis at room temperature is modeled via Drude-Lorentz approach for optical conduction in semiconductors. It was observed that the optical conduction parameters presented by the free electron concentration drift mobility scattering time at femtosecond level reduced electron frequency and plasmon frequency are significantly enhanced via Yb participation in the structure of CdS. In addition remarkable increase in the photocurrent values of the CdS are detected. The nanosandwiching Of Yb improved the light absorbability about 8 times at 1.64 eV. Some other practical applications of the CdS-Yb system are also investigated by the impedance spectroscopy technique.

What was before the big Bangand ? Why are black holes incompatible with our habitable universe ?.
Ahmad Hujeirat,
Heidelberg, Germany

Astronomical observations have confirmed the existence of black holes and the occurrence of the Big Bang event to beyond any reasonable doubt. Also, both theories of quantum fields and general relativity agree that the creation of black holes is irreversible, yet it is not clear why the universe at the verge of the Big Bang, when it was extraordinary compact, chose to irreversibly expand rather than collapsing into an irreversible hypermassive black holes?

Our new scenario predicts that our universe is infinite and subject to repeated Big Bang events of the second type that go off sequentially and/or in parallel, which in turn make the habitability of the universe almost certain, but our cosmic relevance is all-time low.

A multi-Wavelength Study of Gamma-Ray Bursts GRBs: The Cosmic Origins of GRBs & GRB-Gravitational Waves-Binary Black Hole Connection

Aquib Moin / UAEU / UAE

Abstract : In this talk a comprehensive multi-wavelength multi-instrument observational study of the astrophysical processes associated with Gamma-ray Bursts GRBs will be presented. The primary goal of this study is to use multi-wavelength astronomy data space-borne instruments such as NASAs Fermi-LAT and Swift-XRT and ground based telescopes such as ATCA VLA GROND and model their broadband afterglow light-curves multi-wavelength emission profiles and Spectral Energy Distribution to test existing GRB prompt emission and afterglow models relativistic and non-relativistic so as to get inferences on the possible origin and progenitors of GRBs with an aim to establish a new classification on the basis of type and nature of progenitors and the underlying processes. In addition to other models the binary black hole merger model associated with the emission of gravitational waves GW is also being explored to understand and explain the mystery of GRBs and study some aspects of Einsteins General Theory of Relativity. A possible GRB-GW connection will also be highlighted.

Commissioning of the ATLAS Pixel Detector at Run 2 of the LHC and Search for Supersymmetric Particles with Two Same-Sign Leptons or Three Leptons in the Final State

Mahmoud Alstaty[1,2]
[1]CERN
[2]CPPM of Aix-Marseille University
France

ATLAS is one of the major experiments installed at the Large Hadron Collider (LHC) at CERN, whereas two proton beams are colliding at a center of mass energy up to 13 TeV, and gigantic detectors, such as ATLAS, are built to reconstruct the collision events. The ATLAS Detector is designed to exploit the full discovery potential of the LHC. It is composed of several subdetectors, where the Pixel Detector is the innermost part of ATLAS. During Run 1 of the LHC, the Pixel Detector consisted of three layers. Before Run 2 of the LHC, the ATLAS Detector has been upgraded. The upgrade process included the insertion of a new fourth layer, known as the Insertable B-Layer (IBL), to the heart of the Pixel Detector, and thus becoming the closest part of the detector to the beam pipe. The new layer insertion aims at enhancing the detector performance and particle tracking efficiency.

The first part of this talk discusses the commissioning of the Pixel Detector after the insertion of the IBL. First cosmic data in the ATLAS Detector after the IBL insertion were analyzed. The analysis includes but is not limited to studying properties of the pixel clusters, such as charge, pixel cluster size and the Lorentz angle, along with comparing the two different technologies used in the IBL sensors of the Planar and the 3D type. The latter type has been used for the first time in a collider experiment. Analyzing these properties is important to test the detector response, in order to utilize its ultimate capabilities and to achieve better resolutions for measurements.

The Standard Model (SM) of particle physics describes physical phenomena at the fundamental level with great success. However, it suffers from several shortcomings; for instance, it has no candidate for the dark matter, and it has no solution for the gauge hierarchy problem, motivating the search for new physics beyond the SM theories. One of those theories is Supersymmetry (SUSY), which occupies a primer place in the LHC physics program. A search for Supersymmetric particles is presented in the second part of this talk. A channel with two same-sign leptons or three leptons (SS/3L) and missing transverse energy is considered. The results are obtained with L = 13.2 fb^{-1} of data recorded at a center of mass energy s = √13 TeV. For a few SUSY simplified models, a complete optimization process is performed to reach the highest sensitivity for this signal in the two same-sign leptons channel. So far, no significant excess in data over the SM prediction is observed, and new exclusion limits on the supersymmetric particle masses are initially set or updated.

Impact of Binder Concentration and Pressing Force on Performance of Symmetric CNFs Based Supercapacitors

Allan Daraghmeh
An Najah Universirty/ Palestine

Abstract : This paper discussed in details the impact of binder polyvynilidene fluoride PVDF concentration 5 10 and 20 wt% and pressure force ~ 382 ~ 891 ~ 1783 and ~ 2547 MPa for the fabrication of electrodes based on Carbon nanofibers CNFs for supercapcitors. The surface area pore size distribution and morphology were characterized by Brunauer–Emmett–Teller BET method and SEM. The decrease in specific surface area was about 31 % and pore volume 14.6 % with increase in PVDF concentration 5 to 20 wt% at ~ 891 MPa pressure force. The assembled electrodes were tested with two electrode system in aqueous electrolyte. The specific capacitance was 80 F/g for lowest concentration of PVDF 5 wt% and decreased about 28.3% with increase concentrations at same pressing force ~ 891 MPa. In comparing the effect of pressure force on specific capacitance it increases about 38 % for PVDF 10 wt%; force ~ 1783 MPa PVDF 10 wt%; force ~ 891 MPa; their corresponding power density 24502 W/kg at energy density of 6.8 Wh/Kg and 19886 W/ kg at energy density energy of 3.8 Wh/kg. ESR values increase 0.3 to 1.9 Ω with increase in PVDF concentration and decrease again to 0.5 Ω with increase in pressure force. The results show optimal conditions are 10 wt% of PVDF and higher pressure force of~891MPa.

A study of The characteristics of The converted Photons Selected by $B^0 \rightarrow K^{*0} e^+ e^-$ Analysis.

Manar Amer[a], Marie-Helene[b], Ahmad Bassalat[a]
[a] NNU, Palestine
[b] Paris Sud University, France

The LHCb experiment is dedicated to heavy flavour physics. It's main goal is the indirect search of new physics(NP) effects by studying CP violation and rare decays of beauty and charm hadrons. One of the decays studied is the flavour changing neutral current through $B^0 \rightarrow K^{*0} e^+ e^-$ channel. The electrons produced have some difficulties in reconstructing them. They emit one or more bremsshtrahlung photons before being deposited in the calorimeter. This study is performed using a data sample collected by LHCb experiment in pp collisions at the center of mas energies of 7 and 8 Tev during 2011 and 2012. The effect of bremsshtrahlung radiation is quite clear when reconstructing the invariant mass of the electron. We use this unique procedure to look for the clusters of photons deposited in the calorimeter, and check if they are associated with each other. This helps us in understanding the efficiency of bremsshtrahlung recovery algorithm.

Application of CR-39 Microfilm for Rapid Discrimination between Alpha-Particle Sources,

Nidal Dwaikat [a,b]and Anan M.Al-Karmi[a]

[a] Department of Physics, college of Science, King Fahd University of Petroleum & Minerals, Dhahran 31261
[b]Radiation Physics Research Laboratory, King Fahd University of Petroleum & Minerals, Dhahran 31261
KFUPM, SA

Abstract: This work presents a new technique for discriminating between alpha particles of different energy levels. In a first study, two groups of alpha particles emitted from radium-226 and americium-241 sources were successfully separated using a CR-39 microfilm of appropriate thickness. This

thickness was adjusted by chemical etching before and after irradiation so that lower-energy particles were stopped within the detector, while higher-energy particles were revealed on the back side of the detector. The number of tracks on the front side of the microfilm represented all alpha particles incident on that side from the two sources. However, the number of tracks on the back side of the microfilm represented only the long-range alpha particles of higher energy that arrived at that side. Therefore, by subtracting the number of tracks on the back side from the number of tracks on the front side, one could easily determine the number of tracks for the short-range alpha particles of lower energy that remained embedded in the microfilm. Discrimination of the two energy levels is thus achieved in a simple, fast, and reliable process.

Promising Mathematics Techniques For Advanced Nuclear Aspects

Salem Abu Musleh
Palestine University / Gaza / Palestine.

Abstract : We present new calculations for nuclear structure using a model that is based on group theory. This advanced mathematical tool in the context of the Interacting Boson Model and the Interacting Boson-Fermion Model will be presented. A framework will be presented on how to use these techniques in realistic calculations. Our presentation is a prime example of how researchers can use these powerful mathematical tools to make progress in the field of theoretical nuclear physics.

Separation and assembly of colloidal particles by capillary, magnetic and electrostatic forces

Jens Harting

Forschungszentrum Jülich, Helmholtz Institute Erlangen-Nürnberg for Renewable Energy, Fürther Str. 248, 90429 Nürnberg, Germany

Department of Applied Physics, Eindhoven University of Technology, Postbus 513, 5600MB Eindhoven, The Netherlands
email: j.harting@fz-juelich.de

ABSTRACT

Colloidal particles are known to be very efficient stabilizers for fluid interfaces with applications in the food and cosmetics industry, enhanced oil recovery, drug delivery or waste water management. Capillary interactions between particles with different shape, contact angle on the particle surface, or particle-particle interactions are also promising candidates to self-assemble complex structures for the production of new soft materials or applications in the printing and coating industries. We present computer simulations based on a hybrid lattice Boltzmann and molecular dynamics method [1] and demonstrate new ways to self-assemble complex structures by means of capillary interactions and external magnetic fields to steer the movement of ellipsoidal particles [2]. We then introduce spherical magnetic Janus particles with a hydrophobic and a hydrophilic side and demonstrate that their capillary interactions can be tuned by a well-controlled external magnetic field [3,4,5]. At last, we introduce a new algorithm to simulate electrokinetic effects in multiphase flows and colloidal suspensions and demonstrate its ability with several benchmark examples ranging from floating droplets deforming in electric fields to electrowetting [6,7].

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Effect of Noise on Spontaneous and Response Dynamics of Sensory Hair Cells

Rami Amro
PTUK / Palestine

Abstract : Saccular hair cells are exquisite mechanical sensors capable of detecting minute displacements as small as few angstroms and forces on the order of piconewtons. This extreme sensitivity is achieved in a noisy environment with mechanical-noise standard deviation on the order of the stimulus or higher. This study uses stochastic and nonlinear dynamics approaches to unravel the underlying biophysics principles for this extreme sensitivity. Both positive and negative roles of the noise are explored too. Moreover the phase diffusion coefficient of the membrane potential is evaluated for increasing noise levels in the machinery of hair bundle. These calculations are followed by sensitivity calculations for different noise levels and for heterogeneous bidirectional coupling strengths between the hair bundle mechanics and soma membrane potential.

Quantum Mechanical Tunneling and Correlated Barrier Hopping Mechanisms in ZnSe, Maram Taleb and A. F. Qasrawi
AAUJ / Palestine

Abstract : In this article we discuss the AC current conduction mechanisms in ZnSe thin films. The ZnSe thin films which were grown by the physical vapor deposition technique under vacuum pressure of 10-8 bar at substrate temperature of 300 K are subjected to electrical conductivity spectral analysis in the frequency domain of 10-1800 MHz. The experimentally determined variation of the AC electrical conductivity as function of frequency was analyzed in accordance with the tunneling and hopping theoretical approaches. It was observed that below 200 MHz the electrical conduction is dominated by the tunneling of charge carriers through energy barriers localized near the Fermi level with density of ~1019 eV/cm3 within a relaxation time of 5 ns. When the frequency exceeds 200 MHz the electrical conduction is dominated by the correlated barrier hoping mechanism through barriers of height of 0.39 eV. The electrical conduction below and above 200 MHz provide information about regions of positive and negative capacitance effect as a result of tunneling and hopping respectively.

The Magnetization of Single GaAs Quantum Dot with Gaussian Confinement
Mahmoud Ali
An Najah National University /Palestine

Abstract : The Magnetization of single electron confined in a quantum dot by Gaussian confinement potential presented in a magnetic field had been calculated by solving the Hamiltonian including the spin using exact diagonalization method. We had investigated the dependence of the magnetization on temperature magnetic field and confining potential. we have also calculated the statistical energy as essential input data to calculate the magnetization taking into account the presence of the spin. The comparisons show that our results are in very good agreement with reported works.

Elastic and Thermodynamic Properties of Alkali Hydrides XH (X= K, Rb and Cs)
R Jaradat[1], M S. Abu-Jafar[1*], I Abdelraziq[1], D Dahliah[1], R Khenata[2]

[1]Physics Department, An-Najah N. University, Nablus, Palestine.

1) *[2]Laboratoire de Physique Quantique de la Matière et de la Modélisation*
2) *Mathématique (LPQ3M), Université de Mascara, Mascara-29000, Algeria*

Abstract : The calculation of the mechanical and thermodynamic properties of alkali hydrides XH X= K Rb and Cs in rock-salt RS cesium chloride CsCl zinc-blende ZB and wurtzite WZ phases are done by using the density functional theory DFT within the full-potential linearized augmented plane wave FP-LAPW method as implemented in the WIEN2k package. The Perdew-Burke-Ernzerhof generalized gradient approximation PBE-GGA was used for the exchange-correlation potential.

The elastic constants and their related properties as well as the thermodynamic properties were obtained by using the IRelast package. The calculated elastic constants for alkali hydrides with the four structures RS CsCl ZB and WZ at ambient pressure are mechanically stable. The elastic constants and their related properties in the RS structure are changeable with increasing pressure. Elastic constants bulk modulus Shear modulus stiffness and Debye temperatures of these compounds decrease as going K to Cs in the periodic table. These compounds in the RS structure are more mechanically stronger at ambient conditions.

Compare
Ahmad Hujeirat,
Heidelberg, Germany

The strategy of COMPARE is to clarify that scientific statements both in natural sciences and religions are of limited validity and therefore a new domain of uncertainty must exist, where absoluteness and invariance of statements render invalid.

Indeed, the existence of such a domain stem from the verifiable fact that; several millennia of civilization are by no means sufficient to acquire the knowledge necessary for decoding the secrets of the universe, hence a lot of explorations are awaiting our descendants.

By apprehending the limitations of timelessness and validity of scientific and religious truths, we may be able to narrow the gaps between religions and promote differentiated perception of religious beliefs and tolerance: the long term rewarding mission of COMPARE.

Optical Conduction at The ZnS/GaSe Interfaces

Maisam Abdallah and A. F. Qasrawi
AAUJ / Palestine

Abstract : In this article we report the optical conduction parameters for the ZnS/GaSe interfaces. The p-ZnS substrates were prepared by physical vapor deposition technique onto ultrasonically cleaned glass substrates under vacuum pressure of 10-5 mbar. The substrate is used to grow n-GaSe for producing pn-junction. The ZnS/GaSe thin film heterojunction interfaces are experimentally characterized by means of optical spectroscopy techniques. In addition the designed energy band diagram of the heterojunction which was actualized with the help of the optical spectrophotometric data analysis revealed a respective conduction and valence band offsets of 0.67 and 0.73 eV. On the other hand the dielectric dispersion and optical conductivity analysis and modeling which was studied in the frequency range of 270–1000 THz have shown that the interfacing of the ZnS with GaSe strongly affects the properties of ZnS as it reduces the number of free carriers shifts down the plasmon frequency increases the charge

The Effect of Heating on Rheological Properties of Sesame Oil

Tajweed Nairat
An Najah University / Palestine

Abstract : The behavior of sesame oil was determined by this study to be non-Newtonian at the temperature 4 to 58˚C. Our experimental data of shear stress of sesame oil as a function of shear rate was fitted to power law model to determine the behavior of sesame oil. This study proposed three and multi-constant formulas to obtain more suitable prediction of temperature dependence of shear stress and dynamic viscosity of sesame oil. The best AAD% value was found to be 0.003% by using our proposed formulas.

Electrical Properties of MWCNTs Nanocomposites in Microwave Frequency Range

Muna Hajyahya
An Najah University / Palestine

Abstract : Numerous studies have proven the CNTs impressive electronic properties for example CNTs have a capacity of carrying electric current 1000 higher than copper wires. On the other hand CNTs have outstanding thermal properties their thermal stability up to 2800 C0 and thermal conductivity about twice as high as diamond. These properties let the CNTs materials to play a major role in manufacturing electronic devices. The well known properties of carbon nanotubes CNTs can lead to an improvement of the electrical mechanical and thermal properties of host materials such as polymers. In the last years CNT price reduction led to an increase of the studies related to the possibility to use them in many applications. Some of these aplications are: electromagnetic interference EMI shielding radar absorption materials RAM electrostatic painting for car body panels and mirror housings electronic components and elastomers airplane tire for antistatic dissipation capacitors for charge storage on-body antenna design and satellite and automotive applications. Carbon nanotubes CNTs and in particular multiwalled Carbon nanotubes

MWCNTs is used intensively as a filler in a variety of polymers because of their mechanical electrical and thermal properties which allow them to enhance the properties of the material in which they are used as filler for matrix reinforcement. Also this increase in performance takes place even at low percentages of MWCNTs.
The realization of nanocomposites filled with various types of MWCNTs and their electrical characterization for DC and microwaves frequencies are studied. Various samples of nanocomposites based on different polymers filled with different weight fractions of MWCNTs inside polymer matrix are prepared. The dispersion of MWCNTs inside the polymer is a crucial point for samples homogeneity and can effect on their electrical characterizations. The dispersion of MWCNTs inside polymer matrix is investigated by Field Emission Scanning Electron Microscopy FESEM analysis. CNTs have become excellent candidates for the production of high strength and electrically conductive polymer nano-composites NCs. The Nanocomposites resistivity is measured by a two point probe TPP method. The complex permittivity is measured in the frequency band 200MHz-20GHz by using a Network Analyzer E8361A and a commercial coaxial open-ended probe Agilent 85070D. The relationship between MWCNTs physical dimensions and the complex permittivity values of the Nanocomposites is investigated. The tuning feasibility of the permittivity value by changing MWCNTs concentration has been proven. Better performances in the microwave absorption properties by increasing the MWCNTs concentration have been verified.

Finding the Binding Energy for A Deuteron Immersed in A Vapor of Nucleons Using Gaussian Potential and the Variotional Principle

Suhad Daraghmeh ,Henry Jaqaman
Birzeit University
Palestine

Abstract : In our research we study the binding energy of a deuteron immersed in a vapor of nucleons as a function of the nuclear number density by taking into consideration the Pauli blocking effect and the center of mass CM momentum.We use a Gaussian potential for both the singlet and the triplet states to describe the interaction between nucleons and a Gaussian wavefunction for the internal wavefunction of the deuteron. We also include the change in the internal wavefunction in the presence of the vapor by using the Variational Principle.

Friction and Diffusion Coefficients for Coulomb Collision in Drifting Bi-Maxwellian Plasmas

Imad Barghouthi, Walaa' Najeeb Jubeh
Al Quds University /Palestine

Abstract : Invoking Fokker-Planck equation we derive Rosenbluth potentials H and G and their derivatives for Coulomb collision process in drifting bi-Maxwellian plasmas. Using these Rosenbluth potentials and their derivatives we obtain friction and diffusion coefficients. In the derivation we consider three special cases; 1 when the drift velocity is parallel to the ambient magnetic field 2 when the drift velocity is perpendicular to the ambient magnetic field and 3 when there is no drift velocity. The results of special case 3 are found to be in the form of triple hyper geometric function and these results are consistent with the findings of Hellinger ….etc

Tracking Performance of ATLAS Inner Tracker ITK

Theraa TORK [1], Ahmed BASSALAT[1], and David ROUSSEAU[2]
[1]An-Najah National University, Palestine
[2]ATLAS Group, Laboratoire de l'Acclrateur Linaire, France.

Abstract : The Large Hadron Collidre LHC is going through number of upgrade phases in order to increase its luminosity which is important to do precise measurements for the new discovered Higgs boson and extend the searches beyond the standard model. The High Luminosity-LHC HL-LHC will deliver a huge amount of radiation into the detectors and start to damage the sensors. ATLAS and the other detectors will pass through a

series of upgrades in order to cope with these harsh environments. Phase II upgrade of ATLAS will replace the current inner detector ID by a new all silicon detector called Inner Tracker ITK during the 3 rd long shut downLS3 of LHC 2023 - 2025. The ITK will extend the hermit cov- erage into a very forward psedurapdity ηvalues this will increase the efficiency of tracking the charged particles which pass the detectors in very small angles. The tracking performance of the proposed ITK in the very forward region has been studied using high statistics full simulated samples.

Hypergeometric Function Representation of Transport Coefficients for Drifting Maxwellian and Drifting bi-Maxwellian Plasmas

Wala Jubeh and Imad Ahmad Barghouthi
Al Quds University / Palestine

We derive the momentum, parallel energy, and perpendicular energy collisional transport coefficients for drifting bi-Maxwellian plasmas by using the Boltzmann collision integral approach and present them in the form of triple hypergeometric functions. In the derivation, we write the drift velocity $\mathbf{u}$ of the bi-Maxwellian plasma in terms of parallel and perpendicular components (i.e., $\mathbf{u} = \mathbf{u}_{\parallel} + \mathbf{u}_{\perp}$), parallel and perpendicular with respect to the ambient magnetic field, and we consider the Coulomb collision interactions. We consider two special cases: first, when the drift velocity is parallel to the ambient magnetic field (i.e., $\mathbf{u} = \mathbf{u}_{\parallel}$), and second, when the drift velocity is perpendicular to the ambient magnetic field (i.e., $\mathbf{u} = \mathbf{u}_{\perp}$). For the first case, the transport equations and consequently the transport coefficients are derived and presented in the form of double hypergeometric functions; these results are consistent with the findings of Hellinger and Trávníček [Phys. Plasmas **16**(5), 054501 (2009)]. For the second case, the transport coefficients are obtained and found to be in the form of double hypergeometric functions. When we combine these two special cases, i.e., for general $\mathbf{u}$, the transport coefficients are shown to be in the form of triple hypergeometric functions. Also, we investigate the above problem by using another approach, i.e., Fokker Planck approximation. We obtain similar results for both approaches. *Published by AIP*

Investigating the Protein-Solvent Non-Bonded Energy Interactions in the THz Range for BLIP Protein, Using a Recurrence Plot Based Wiener Khinchin Method

Khadija Abulibdeh, Wael I . Karain
Birzeit University/ Palestine

Abstract : A protein and its surrounding water molecules are coupled by non-bonded energy interactions. In this work, we prepare time series for non-bonded energy interactions from molecular dynamics simulations between all the residues in the β-Lactamase Inhibitory Protein BLIP, and water molecules within 10 Å of each residue, at 150K and 310K respectively. The frequency spectra, and their dependence on the residue type and solvent accessibility, are computed for these time series using a Recurrence Plot based Wiener-Khinchin method (RPWK). The results are compared to those determined using the classical auto-covariance based WienerKhinchin method (WK).

Thermally Controlled Electrical Switching and Band Filtering Features of Ga_2S_3 Films Sandwiched with Indium Nano layers

Eman Nazzal and A. F. Qasrawi
AAUJ / Palestine

Abstract : In this study thermally controlled electrical switches and band/pass reject filters are designed by using three stacked layers that comprises indium nanolayer of thickness of 50 nm between two layers of 500 nm thick Ga2S3. The devices which were characterized by means of X-ray diffraction temperature dependent electrical conductivity and impedance spectroscopy are observed to be of irregular nature of structure that exhibit thermal hysteresis near room temperature. The conductivity is observed to memorize the thermal cycling heating and cooling with large difference between the generated currents during the cycling process. Such property indicate the applicability of the device as thermally controlled electrical switches. In addition the capacitance spectroscopy revealed wide range of tunability in the spectral range of 0.01-1.80 GHz. The impedance spectroscopy evaluation indicated the usability of this structure for microwave filtering with cavity resonance frequency of 1.0 GHz.

Post Annealing Effects on the Structural Properties of InSe Nanosandwiched with Au Layer

Olfat Omareya and A. F. Qasrawi
AAUJ / Palestine

Abstract : In this study we discuss the effect of the vacuum annealing at 200 and 300 oC on the structural properties of the InSe films nanosandwiched with Au layer of thickness of 20 and 100 nm. The metal induced crystallization process in InSe is observed to exhibit novel structural evolutions that leads to the formation of γ -phase of InSe when annealed at 200 oC in the presence of 100 nm thick Au layer. Raising the annealing temperature to 300 oC destroyed the γ phase and formed the orthorhombic

In4Se3. The lattice parameters of the new structure and the physics beyond this structural evolution are predicted and discussed.

Fabrication and Characterization of Wide Band Photoconductor Array
Sufyan Shehada and Muayad Abu Saa
AAUJ / Palestine

Abstract: In this thesis a wide band photoconductor array is designed and characterized. The wide band photoconductor array is designed materials exhibiting energy band gaps of values in the range 1.1-3.33 eV. Our photoconductor array consists of Cadmium sulfide Gallium Selenide Indium Selenide Germanium Zinc Sulfide and Indium Selenide/ Cadmium sulfide heterojunction. The photoconductor array is subjected to various types of laser excitations including lasers of wavelengths of 406 632 850 and 1550 nm and tungsten light. The measurements allowed determining the array photoresponsivity photosensitivity external quantum efficiency and internal quantum efficiency. The photosensitivity and generated photocurrent increase with power for lasers and tungsten light while external quantum efficiency internal quantum efficiency and photoresponsivity decrease with power of lasers and tungsten.

The maximum value of photosensitivity is achieved for Cadmium sulfide while the maximum value of generated photocurrent is achieved for connected array. The maximum values of external quantum efficiency internal quantum efficiency and photoresponsivity are achieved for Indium Selenide.

The Magnetic Properties of GaAs Double Quantum Dots in a Magnetic Field
Eshtiaq Hijaz, Mohammad Elsaid, Musa Elhasan
An Najah University / Palestine

Abstract : The magnetic properties such as the magnetization and the magnetic susceptibility of two interacting electrons confined in double quantum dots had been calculated. The double quantum dots is under the effect of an applied uniform magnetic field taken to be along z-direction in addition to a Gaussian barrier. The variational and exact diagonalization methods had been used to solve the Hamiltonian and compute the magnetic properties of the double quantum dots. In addition we had investigated the dependence of the magnetization and the magnetic susceptibility on the system's parameters. The singlet-triplet transitions in the ground state of the double quantum dots spectra and the corresponding jumps in the magnetization and magnetic susceptibility curves had also been shown. The comparisons show that our results are in very good agreement with reported works.

Poster Session

Mathmatics

Fractional Deifferentiation
Wisam Fakhouri / PPU

Abstract : The fractional calculus is a theory of integrals and derivatives of arbitrary i.e. non-integer order. And it is considered as a natural extension of classical calculus. Thus there are many preserved basic properties between them. This thesis consisting of four chapters explores the concept and definition of fractional calculus. In this thesis a brief history and definition of fractional calculus are given. Two definitions of fractional derivative are considered namely the Riemann-Liouville and the Caputo definitions of the fractional derivative. Some illustrative examples are included. Further we present some basic properties with proofs. Finally present some fractional differential equations with an emphasis on the Laplace transform of the fractional derivative.

Dynamics of piecewise isometries
Farida Ghazawne / BZU

Abstract : We analyze and give details of the paper of Arek Goetz where we begin with a systematic study of Euclidean piecewise isometric dynamical systems p.i.d.s. with a particular focus on the interplay between geometry symbolic dynamics and the group of isometries associated with p.i.d.s. We investigate various aspects of the dynamical information contained in the coding: symbolic growth and the periodic behavior of codings and cells. This theoretical investigation is motivated by the many examples of piecewise isometric dynamical systems found recently in the literature. Piecewise isometric dynamical systems are direct generalizations of interval exchange transformations to non-invertible higher dimensional maps.

Weighted Estimator for the Survival and Cumulative Hazard Functions of Quality Adjusted Lifetime

Hammam Hamad / AAUJ

Abstract : The survival function of restricted quality adjusted lifetime RQAL has become more important in studies nowadays than survival function of overall lifetime. The reason is due to the fact that the researcher needs real-time for the observations under the conditions of his or her life. In this work we will estimate efficient estimators for the survival function of restricted quality adjusted lifetime if the data has left and right censorship. Also we derived a class of estimators for the cumulative hazard function based on estimations of the survival function of RQAL. Simulation study using R-programming has been conducted to compare the efficiency of the estimators of the true survival function.

Numerical Results With Economic Implications of A Continuous Time Model
Sondos Khalil / BZU

Abstract : In this paper we consider the problem faced by an economic agent who is trying to find the optimal consumption investment and pensions strategies while investing his total wealth in a financial market composed by one risky-free asset and one risky asset whose prices evolve with time according to linear stochastic differential equation.We resort to the dynamic programming principle to derive an explicit solution for the problem under consideration.

A New Quick Algorithm For Finding The Minimal Spanning Tree
Mai Mismar / QOU

Abstract : In this paper I propose a new Algorithm for finding the minimal spanning tree in a graph beginning with any node in the graph. This method is based on creating the cost matrix and then begin to connect the adjacent vertices with the minimun cost using the MinMin criterion. A

Minimal Spanning Tree is a subset of the positive edge-weighted undirected graph that connects all the vertices together without any cycles or loops and with the minimum possible total edge weight. A single graph can have many different spanning trees [1] but all are of the same cost. There are many uses for the minimum spanning trees in our lives one example is a telecommunications company which is trying to lay out cables in a new neighborhood. So in general a minimal spanning trees are often used in Network design like telephone electrical hydraulic TV cable computer roads.

Fuzzy Formulation of Multi-Item Inventory Model with Shortage Limitations
Amani Muhanna, Iyad Suwan / AAUJ

Abstract : The shortages in inventory models are a mixture of back order and lost sales that result the unmet demands of customers during the shortage period. In this work the multi-item inventory model is presented with two shortage limitations. The first limitation depends on the expected varying back order cost and the second one depends on the expected lost sales cost. Our model is formulated in both crisp and fuzzy cases to analyze how to conclude the optimal values of order quantity and the reorder point for each item. As a result the minimum expected total cost is achieved where the Lagrange multipliers technique is used for this purpose. In the presented model the demand during leading time is considered as a random variable that follows the normal distribution. As an illustration numerical examples are applied and the results of fuzzy and crisp models are compared.

Cone Metric Space
Marwa Qadah / BZU

Abstract: In this paper some topological concepts and definitions are generalized to cone metric spaces. It is proved that every cone metric space is first countable topological space and that sequentially compact subsets are compact. Also we define diametrically contractive mappings and asymptotically diametrically contractive mappings on cone metric spaces to obtain some fixed point theorems by
assuming that our cone is strongly mini hedral.

An Inventory Control Model with Logistic Lead Time Demand Distribution
Fuad Salamah, Mohammad Najib Assad
An-Najah National University

Abstract : In this paper, we consider an inventory control model which has been developed by Ouyang and Chuang (2001). The model is a mixture of backorders and lost sales where the order quantity, lead time and the backorder rate have to be determined in order to achieve minimum total expected annual cost. An analytical closed form solution is derived by adopting the logistic distribution for the lead time demand with certain substitutions instead of the normal distribution, which was adopted by Ouyang and Chuang. The corresponding solution algorithm of our model was effective and easier than the one of Ouyang and Chuang model. Moreover, the effects of the model parameters are also studied.
Keywords: Inventory; Backorder rate; Crashing cost; Lead time; Logistic distribution

The Importance of Mathematics and Statistics in the Palestinian Economy
Wisam Samarah / QOU

Abstract : Mathematics plays a crucial and vital role in economics. Mathematical economics is a requirement for an economic degree. Economic Theory follows the following steps:

1. Starts with a philosophical idea.
2. The idea is written and proved mathematically.
3. An empirical test of the theory using statistical methodologies –econometrics.
4. The theory is adapted.

Thus only with a logical mathematical prove can we proceed.
With the increasing amount of data availability and the easy access to large amounts of data scientific research can play a more crucial role in

the decision making both on the microeconomic and macroeconomic levels in Palestine. The purpose of this paper is to demonstrate the importance of both mathematics and statistics in the decision making process in Palestine an increasing digital world. With the improvement in the data sources in Palestine it is important for Palestinians to adapt a more quantitative approach to the challenging economic problems both on the micro and macroeconomic levels.

Dynamics Of Nonlinear Difference Equation

Mohammad Shalalfeh
BZU

The main goal of this seminar is to investigate the boundedness, invariant interval, semi-cycles and global attractivity of all nonnegative solutions of difference equation :

$$x_{n+1}=\frac{x_{n-1}}{\beta+\gamma x_{n-2k}^{p}x_{n-4k}+\gamma x_{n-2k}x_{n-4k}^{p}},\qquad n=0,1,2,3,\ldots$$

where the parameters β and γ are positive real number and the initial conditions $x_{-4k},x_{-3k},\ldots,x_0$ are nonnegative real numbers and $k=1,2,\ldots$ and $p=0,1,2,3,\ldots$

We give a detailed desciption of the semi-cycles of the solutions, and the determine the conditions that satisfy the global asymptotically stable of the equilibrium points.

In particular, this difference is a generalization of the difference equation that is

$$x_{n+1}=\frac{x_{n-1}}{\beta+\gamma x_{n-2}^{p}x_{n-4}+\gamma x_{n-2}x_{n-4}^{p}},\qquad n=0,1,2,3,\ldots$$

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A discrete Game Theoretical Model

Fedaa Shoman
BZU

Abstract : In this paper we will study a special case in the decision model introduced by Dr. Mousa et. al by considering one type of homogeneous individuals who have uncertainly in their decision. The model has model two possible decisions that individuals can make. The individuals' decisions are made according to individuals' preferences. The preferences have the interesting feature of taking into account not only how much an individuals like or dislike a certain decision but also the other individuals decisions. In this paper we characterize the space of all parameters in which the Nash equilibria are either pure cohesive or disparate or mixed. This decision model has wide applications in real life and can be used to understand better the social interaction tourism industry and economical and political revolutions.

Comparison between Neural Networks and Logistic Regression in predicting H1N1 infection

Soos Nasouh[1] , Herzallah Shahd[2]
[1]PTUK .
[2] BZU

Abstract : This research aims to use the artificial neural networks method ANNs to predict and in particular to compare neural networks with logistic regression method in predicting the result of H1N1 test. The research employs regression analysis which uses the methods of artificial neural networks and logistic regression. Also it conducts a comparison between these two methods using data which contain the results of H1N1 test the National Hospital in Nablus to reach the best method to be employed to predict the results of the test. The results show that the neural network is better than logistic regression in predicting the results of the test.

Modeling Factors Affecting the Ownership of landline and Mobile Phones in Palestine

Soos, Nasouh[1], Abu Hassan, Hassan[2]
PTUK, BZU

Abstract : The telephone coverage in Palestine has rabidly changed through the last period. The number of mobile phone subscribers in Palestine has continued to grow whereas landline phone subscribers have started to decline.
This paper used data gathered by surveys conducted by The Palestinian Central Bureau of statistics in 2011: Information and Communication Technology Household Survey, 2011, and the

Labor force survey round 62 third quarter 2011. The structural changed in telephone coverage in Palestine from 2000 to 2011 is also featured. In addition the relationship between telephone coverage in 2011 and several characteristics of households is examined.
The researcher used a multinomial logistic regression for modeling factors affecting the ownership of landline and mobile phones in Palestine. In order to apply multinomial logistic regression the researcher used four categories. The first category for ownership of landline phone, the second category for ownership of mobile phone, the third category for ownership of landline and mobile phone, and the final category for owning neither landline nor mobile phone. For multinomial logistic regression model the researcher use owning neither landline or mobile phone as a reference category

Physics

Temperature Dependent Deformation in BZZN Pyrochlore Ceramics

Mays Abdalghafoor, A .F . Qasrawi
AAUJ

Abstract : In the current work, the bismuth niobium zinc oxide (BZN) are subjected to an in situ temperature dependent X-ray monitoring of the deformation process in the BZN. Particularly, the BZN which was prepared by the conventional solid state reaction technique was subjected to a heating process in the temperature range of 30-200 ^{o}C. The analysis of the X-ray diffraction patterns at each temperature allowed determine the temperature dependence of the lattice parameter, the grain size, the dislocation density, the micorstrain and stress as well as the stacking faults. It was observed that the pyrochlore ceramic exhibit a permanent broadening in the main peaks indicating the nonuniform deformation process at high temperatures. The so called plastic deformation in this material was controlled by the recrystallization process that target the re-nucleation to rebuild the crystallites. It is also observed that the enlargement of the crystallites or grains at temperatures below the plastic deformation limit is dominated narrower grain boundaries which make the dielectric property of the material more stable.

Performance Study of Inner Tracker ITK in ATLAS at the Large Hadron Collider LHC at CERN

Tasnim Abdallah
NNU

Abstract : ATLAS is one of the main general-purpose detector in LHC it will be up-graded in 2023-2025 which is called phase II. The major upgrade will be
for the inner detector it will be replaced by the new inner tracker ITK. At
that time the stage of high luminosity LHC HL-LHC will start with luminosity five times more than the luminosity in run 2 nowadays which creates a hope for a substantial advancement in the understanding of physics phenomena related to high-energy physics. The layout of ITK will cover a pseudorapidity up to |η| = 4 while the current inner detector covers apseudorapidity up to |η| = 2.5. In this thesis the track reconstruction efficiency and the fake rate as a function of different variables is studied in the ITK of ATLAS including
particles travel in the forward region with a values of |η| 2.5. Tracking reconstruction efficiency as a function of several variables for
two different samples is compared and decided which is better to use a
modules of pixel size 50 × 50 μm^2 or 25 × 100 μm^2 this study is done withhigh pile-up μ = 200. The tracking reconstruction efficiency also is studied as the value of μ is increased this allows to study the roboustness of the track reconstruction efficiency with respect to high pile-up.

Optical and Temperature Dependence Characteristic of the In-Mg Stacked Films
Shatha N. Abu Alrub, A. F. Qasrawi

AAUJ

Abstract: In the current work, an indium and magnesium thin films of thickness of 100 nm was deposited onto glass substrates and characterized by means of X-ray diffraction and UV-visible light spectrophotometry. The indium films are observed to be highly transitive with tetragonal type of structure. The temperature dependent X-ray diffraction analysis which were carried out in the temperature range of 303-403 K, has shown a stabilized grain size and strains for temperatures greater than 360 K. On the other hand, the Mg films are of amorphous nature and highly reflective compared to those of indium. The temperature show no effect on the crystalline nature of Mg. When the Mg coated In films were re-characterized. An inverse process of grain grow was observed. These variations which were associated with high reflectively were assigned to the recrystallization and recovery processes in the film.

Monitoring the Crystallization process in Selenium films
Hadil. D. Aloushi , A. F. Qasrawi
AAUJ

Abstract : In the current study we focus on the crystallization process in Selenium thin films by the x – ray diffraction technique. The Selenium thin films which are prepared by the physical vapor deposition technique under vacuum pressure of 10-5 mbar onto ultrasonically cleaned glass substrate we heated in the range of 30 – 150 o C in 10o C step the x – ray diffraction monitors the crystallization process. It was observed that the freshly produced Selenium films convert amorphous to polycrystalline at temperature of 80o C. The Selenium contained two structural phase named monoclinic and hexagonal raising the temperature above 80o C make the hexagonal phase more dominant over the monoclinic. The x – ray patterns were also used to determine the grain size stacking fault dislocation density and micro strain for both phase as function of temperature. It is concluded that the grain size decreased with increasing temperature up to 110o C beyond which the grain size steady increased with increasing temperature. Cooling the Se room temperature does not alter the properties which were obtained at high temperature.

Design of the ZnS/CdSe Heterojunctions
Batool Maher, Muad Abu Saa ,Hazem K. Khanfar, A .F . Qasrawi
AAUJ

Abstract : In the light of the designed energy band diagram which concern sufficiently large conduction and valence offsets here in this work we fabricate a new class of thin film transistors which can perform as optoelectronic component. The ZnS/CdSe heterojunction device which is characterized by means of X-ray diffraction optical spectrophotometry and current voltage characteristics are observed to exhibit smart features. Particularly the large lattice mismatch between the cubic ZnS and hexagonal CdSe and large difference in the energy band gaps a quantum confinement is actualized between the energy states of both materials. Such confinement result in high photocurrent values generated by blue light lasers the ZnS side and by the tungsten and red laser light the CdSe side. The device is also capable of wide tunability via photoexcitation processes Further studies on the device responsivity against microwave excitations are running to find additional applications for the device.

Identification of Water Pollutant content in Nablus District using FTIR Microspectroscopy.

Amal Atari[a] , Ahmed Bassalat [a], Hadil Abualrob [a], Gihan Kamel [c] , Sameer Shadeed [a]
[a] An-Najah National University, Palestine
[b] Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME), Jordan
NNU

Abstract : Population growth industrial expansion and agricultural practices are some of the factors that contribute to raising contamination levels in water supplies in addition to increasing pressure on our limited water resources. Much of these contaminants come chemicals micro-organisms heavy metals contamination related to physical conditions and many others. Because these kinds of contaminants threaten human health and living environments it is important to study and control them. The goal was to identify variety contaminants in water samples different sources using new analytical techniques. Fourier transforms infrared microspectroscopy FTIR has been suggested for this purpose because many contaminants have their specific infrared absorption signatures. First study will be performed at the Water and Environmental Studies Institute WESI at An-Najah National University using traditional identification methods then the results will be cross-checked at the Synchrotron for Experimental Science and Application in the Middle East SESAME in Jordan.

Analysis of the Conductance and Capacitance Spectra in Au/MoO_3/C Devices

Masa J. Daragmeh[1],M. Abu Saa[1], Hazem K. Khanfar[2], A. F. Qasrawi[1]
AAUJ

Abstract In this report we present the design and characterization of Au/MoO3/C passive mode thin film device. The device which was prepared by the physical vapor deposition technique under vacuum pressure of 10-8 bar was characterized by means of impedance spectroscopy technique in the frequency domain of 10-1800 MHz. A series-parallel resonance phenomena followed by negative capacitance effect was observed near 300 MHz. That behavor of the capacitance is accompanied with change in the responsivity of the conductance spectra. Particularly the conductance spectra change direction increasing to decreasing trend of variation against frequency increment. The maximum conductance value is observed at 300 MHz. The theoretical analysis and computer simulations that targeted the exploration of the physics of this phenomena have shown that the Au/MoO_3/C device is of tunneling diode type in which the current conduction covert tunneling to correlated barrier hoping at 300 MHz. furthermore the theoretical analysis of the capacitance spectra has shown that the oscillatory motion is limited by the plasmon frequency of the MoO3 at the Au and C interfaces. The performance of this device have shown its suitability for applications where parasitic cancellation of capacitance is needed.

Identification of the Structural Phases in $TlInS_2$ doped with Selenium

Areen A. Hamarsheh, A. F. Qasrawi
AAUJ

Abstract: Recently, $TlInS_2$ crystals are observed to exhibit Faraday Effect in which an interaction between light and magnetic field take place at 633 nm. As it presents an efficient magnetooptic material, we here in this work, report the X-ray analysis of the $TlInS_2$ crystals doped with selenium. It is observed that the crystal structure of this material comprises two structural phases named monoclinic and tetragonal. The lattice parameters, microstrain, dislocation density, stacking faults and crystallite sizes are determined by means of modified Scherrer equations and with the help of “TREOR 92” software package. It is observed that, the crystallites built form tetragonal cells are larger in size than those built from monoclinic. In addition, all the mechanical arameters are accordingly attenuated in accordance with the cell type. The work is promising as it open the doors for using the $TlInS_2$ crystals in applications where highly strained structures are required.

Constraints on Cosmic Strings Using Gravitational Waves Data

Shaymaa Hussein
NNU

Abstract: Cosmic strings are objects that may have formed in the early Universe. They were first introduced by the theoretical physicist Tom W. B. Kibble in the late 70s as a possible result of some field theories including the famous Higgs theory. Once formed a cosmic string loop oscillates and radiates gravitationally offering an experimental signature for the existence of cosmic strings. The data first Advanced LIGO Observing run O1 is analyzed to specifically search for stochastic gravitational wave background cosmic string loops. No evidence of such signals was found in the data. We can use the fact we did not detect anything to constrain the properties of cosmic strings. To set upper limits on the cosmic string parameters we consider three recent loop distribution models. We first characterize the gravitational-wave emission then we derive constraints on the string tension $G\\\\\\\\mu$ and the probability of reconnecting using LIGO stochastic O1 analysis pulsar timing arrays cosmic microwave background and Big-Bang nucleosynthesis experiments.

Temperature Effects on the Optical Properties of Ga2S3 thin Films Temperature Effects on the Optical Properties of Ga2S3 Thin Films

Nouf Ibrahim and Muayad Abu Saa
AAUJ

Abstract: The band gap and band tail are key parameters for a functional chalcogenide semiconductor to its applications in optoelectronics nanoelectronics and photonics devices Ga2S3 is a thin film with d = 1050 nm indirect energy band gap the temperature effect in optical properties with increasing T 300 to 400 K then Eg increase 2.2 to 2.6 eV but Et decrease 1.2 to 1 eV .

Numerical Solution of the equation of motion of a particle moving in a rotatinfgparabola

Hadi Khaliliyyah, Jihad Asad

PTUK

In this study we consider a spherical particle moving in a rotating parabola defined by $z = Cs^2$ using the Lagrangian method. As it is known, Lagrange method is based on two scalar quantities (i.e., Kinetic and Potential energies). So, the first step is constructing the Lagrangian of the system, and then applying Euler- Lagrange equation to obtain the so- called equation of motion. The obtained equation of motion is a Homogenous second order equation which cannot be solved analytically, therefore we solve this equation numerical using a matlab code called ode45 which is based on Runge-Kutta. Finally, we plot the radial position of the particle against time for some initial conditions.

Effects of Annealing on the Structural and Optical Properties of Copper Oxide Thin Films

Alaa Kmail and A. F. Qasrawi
AAUJ

Abstract : In this work we explore the thin film thickness and the post annealing effects on the structural and optical properties of copper oxide thin films by means of X-ray diffraction and ultraviolet-visible light spectrophotometry techniques respectively. Particularly various thin films of copper oxide which exhibit thicknesses in the range of 100-1000 nm will be deposited by the physical vapor deposition technique. The resulting films will be subjected to X-ray diffraction to determine the crystallize nature of the films as well as to determine the thickness effect on the crystallography of the films. In addition the films thicknesses effects on the optical transmittance reflectance absorbance as well as energy band gap will be determined to identify the most appropriate thickness for optoelectronic applications. In addition the possible band tails formation will be taken into account..

Effect of Transparent Indium on the Dielectric Properties of MoO3 Films

Haifa Kmail ,M. Abu Saa , Hazem K. Khanfar, A. F. Qasrawi
AAUJ

Abstract : In the current study an MoO3 thin film of thickness of 500 nm is coated with transparent indium film of thickness of 50 nm. The structural and dielectric properties of the indium coated and uncoated films are studied by means of X-ray diffraction and ultraviolet –visible light spectrophotometry techniques respectively. Remarkable enhancement in the absorption coefficient associated with redshift in the energy band gap is observed. It is also observed that the transparent metal coating onto the MoO3 duplicate the values of the dielectric constant without altering the shape of the spectra. It also enhanced the optical conductivity spectral values by at least 10 times. The Drude –Lorentz modeling of the imaginary part of the dielectric spectra has shown that the addition of 50 nm thin layer of indium could improve the drift mobility and increase the number of free carriers available for optoelectronic conduction. The indium layer also shifted the plasmon frequency of the MoO3 films to gigahertz regions. The latter make the MoO3/In interface attractive for use in microwave applications as a resonant cavity.

Optical and Dielectric Dispersions in MoO3 Films

Haifa Kmail
AAUJ

Abstract : In this work we have studied the optical and dielectric properties of MoO3 thin films. The films which were prepared by the physical vapor deposition technique on to ultrasonically cleaned glass substrates exhibited direct allowed electronic transition in an energy band gap of 3.25 eV. In addition the 500 nm thick MoO3 thin films exhibited novel dielectric spectra presented by resonance peak centered at 678 THz. The full wave half maximum of the peak is ~150 THz. The property of this material makes it attractive for applications which need passive type devices and high energy photonic application. Moreover the analysis of the imaginary part of the dielectric spectra allowed determining the optical conduction parameters which are also very suitable for light communications.

Optical Properties of the In_2Se_3 / CuO Heterojunctions

Reham Kmeil and A. F. Qasrawi
AAUJ

Abstract : In this work a new class of InSe and CuO based devices are produced and characterized to form InSe/CuO. After that we needed to annealed it at 250 Co to form In2Se3/CuO. The properties of the In2Se3 CuO and In2Se3/CuO will be investigated by means of optical analyses and X-ray diffraction. While the optical characterizations will allow determining the band offsets and result in the construction of the fundamental band diagram the X-ray diffraction will show the nature of crystallization and lattice matching. The resulting dielectric response that allow determining the optical conductivity will be modeled with the help of Drude-Lorentz theory to determine the effect of the CuO layer on the drift mobility free carrier density scattering time at femtosecond level and plasmon frequency of InSe. These studies will determine the possible applicability of the In2Se3/CuO interface in electronic technology as dual purpose device.

Optimisation Of Refractive Index Of Selenium By Fresnel's Equations And Swanepoel Technique

Sarah H Najar, Anan Hussein, A.F,Qasrawi
AAUJ

Abstract : Selenium film was deposited on a transparent glass substrate using physical vapour deposition (PVD) technique. The optical characterization of thin Se film was studied by two techniques, one of them, the analysis of transmission spectra measured at normal incidence in the spectral range (190-1100) nm. The envelope method, proposed by swanepoel is commonly used method for studying optical properties of films with uniform and non-uniform thickness. (the refractive index n , the dielectric

constant ε_s , the thickness (d) are calculated and found to be 2.525 , 6.375 and $1.214\mu m$ respectively .the other technique is used is Fresnel's equations the refractive index n and the dielectric constant ε_s , are calculated and found to be 2.384 , 6.406 respectively .

Feature of the turbulence processes in the magnetohydrodynamic environment

[1,2] Kozak L., [1]Petrenko B., [3]Kronberg E. [4]Grigorenko E., [5]Lui A.
[1] Kyiv Taras Shevchenko University, Kyiv, Ukraine
[2] Space Research Institute National Academy of Sciences of Ukraine and State Space Agency of Ukraine, Kyiv, Ukraine
[3] Max Planck Institute for Solar System Research, Göttingen, Germany
[4] Space Research Institute, RAS, Russia
[5] Johns Hopkins University Applied Physics Laboratory, Laurel MD, USA

Turbulence is the natural state of the hydrodynamic flows and cosmic plasma; therefore, studying its characteristics is essential for the understanding of the fundamental properties of nature. In magnetohydrodynamics, the properties of turbulence can be dramatically affected both by flow boundaries and the scales of the structures (waves, vortices, etc.) formed by magnetic and electric fields. The turbulence of plasma flows can be generated by many classes of instabilities: drift dissipative, kinetic, magnetohydrodynamic, etc. In addition, the turbulence is characterized by a large number of degrees of freedom and nonlinearly interacting modes. Scientists typically use statistical physics and the theory of probability to describe such a medium. This way they can obtain information about average variations in the macroscopic parameters of the plasma medium in time (or space) without scrutinizing the conditions of excitation of specific nonlinear processes. In this work, we address the features of turbulent processes in the magnetospheric tail.
In this work we used the measurements of four spacecraft of the space mission of the Cluster-2 with time resolution 22,5 Hz in the moments of magnetic field dipolarization for the analysis of turbulent processes in the magnetosphere plasma.
We carry out the following: analysis of tail and evolution on different scale of the probability distribution function of magnetic field fluctuations; determination of kurtosis and analysis of expanded self-similarity ESS-analysis; spectral power density analysis; amplitude analysis and wavelet power spectral of the signal. In the wavelet analysis, we used the Morley wavelet, consisting of a plane wave modulated by a Gaussian.
Among the obtained results we note that for all measurements considered during the dipolarization (DP) of the magnetic field the distribution function of the magnetic field fluctuations is substantially wider than at moments up to DP. Power law tails indicates on non-Gaussian statistics of processes, as well as the kurtosis of energy of large-scale perturbations generated by the source.
In this investigation we carried out a comparison of obtained dependencies with existing at the moment models for description of both uniform and non-uniform turbulent processes.
We can note the significant difference of the spectral index for moments before and during the dipolarization of the magnetic field: the spectral index is close to Kolmogorov's model before; and close to electron-magnetohydrodynamic turbulence during the event.
Wavelet analysis showed the presence of both direct and reverse cascade processes, and presence of Pc4 and Pc5 pulsations.
The work is done in the frame of the grant Az. 90 312 from the Volkswagen Foundation («VW-Stiftung»).

The Effects of Llight Intensity on Day and Night Shift Nurses- Health Performance

Noorhan Mohammad
PTUK

Abstract : This study shed the light on the effect of light intensity on some of the dependent variables such as blood oxygen saturation SPO_2% heart pulse rate P.R arterial blood pressure systolic SBP diastolic DBP and tympanic temperature T of nurses in their shift work. The sample consists of 207 nurses of both genders 104 female 103 male with mean age 29 years and the mean duration of employment 6 years were randomly chosen as a sample to fulfill the aim meant. This sample was taken four hospitals in Nablus city. The values of light intensity in all hospital ranged 220 Lux to 1000 Lux at the day shift and 500 Lux to 1700 Lux at the night shift. Number of measurements concerning the blood oxygen saturation heart pulse rate arterial blood pressure systolic and diastolic and tympanic temperature at different light intensities were taken for the ed sample before and an after exposure to light. Strong positive correlation Pearson Correlation Coefficient with light intensity was found for all measured variables. The statistical result for the dependent variables SPO2% P.R SBP DBP T showed that Pearson correlation coefficient R between light intensity and the dependent variables are approximately equal to one and the Probabilities P are 0.05

Brownian Dynamics Simulations for Complexation of DNA with Nano-Cationic Dendrimers

Alaa Murrar, Khawla Qamhieh
Al – Quds University

Abstract : We employed Brownian Dynamics BD simulations to determine the influence of salt concentration and the number of base-pairs bps in the double-stranded DNA dsDNA on the translational diffusion coefficient the impact of salt concentration on the persistence length of the dsDNA chain the effect of salt concentration and pH on the interactions of the dsDNA chain with polyamido amine PAMAM Dendrimer how the salt concentration and the dsDNA chain length number of bps play an important role in the formation of linker and tail/s in the dsDNA-two-Dendrimer aggregate and what are the morphologies that appear when different generations of the Dendrimer form an aggregate with the dsDNA chain. To fit our computing capabilities and achieve simulation speed without going into some complicated details we used the bead-spring model for the dsDNA chain and the charged hard sphere model for the Dendrimer. For the dsDNA chain we observed a non-monotonic dependence of the translational diffusion coefficient on both of the low salt concentration and the number of bps in the dsDNA chain i.e. the chain length. While the high salt concentration has a little effect on the translational diffusion coefficient. The results we obtained for the translational diffusion coefficient are in good agreement with Lukacs and co-workers experimental study. As for the persistence length it seems to be increased by decreasing the salt concentration in good agreement with de Pablo and co-workers'Coarse-Grained Molecular Dynamics CGMD simulations. For the dsDNA-Dendrimer complex our models predict that the dsDNA chain strongly wraps around the Dendrimer at both low salt concentration 10 mM and pH ≤ 7 whereas no complex is formed in both of high salt concentration and high pH. Some of these results are in good agreement with Yu and Larson's Monte Carlo MC simulation study for different generations of PAMAM Dendrimer.
In the aggregate that consists of dsDNA chain and two Dendrimers G4 and G6 the linker and/or the tail/s clearly appear/s at a salt concentration ≥ 10 mM and ≤ 120 mM with dsDNA chain length ≥ 97 nm number of bps ≥ 288. In addition to that for longer dsDNA chains we noticed the overcharge phenomenon for the Dendrimers in the aggregate and the degree of it depends on the dsDNA chain length i.e. the number of bps. These results are in good agreement with Larin and co-workers'and Luylin and co-workers' BD simulation study. When a certain number of the lower generations of the Dendrimer G2 and G4 interact with the

dsDNA chain to form aggregates a rod-like morphology appears also we got a globular one for the G4 aggregate this is in good agreement with Qamhieh and co-workers' theoretical study and Ainalem and co-workers' experimental study whilst for high generation G6 we obtained almost rod-like morphologies.

Characterization of Palestinian Soil Samples Using FTIR –Microspectroscopy

Hend Shahed[1],Ghassan Saffarini[1], Gihan Kamel[2,3]
[1]Radiation Physics Laboratory, Department of physics, Faculty of Science, An- Najah National University, Nablus, Palestine
[2] SESAME (Jordan)
[3] Department of physics, Faculty of Science, Halwan University, Cairo, Egypt

Forty Palestinian soil samples were collected from different locations in the West-Bank –Palestine. The samples were sealed in Plastic bags. Then they were examined in SESAME using Globar infrared source in the mid region in the diffuse reflectance mode. Work is still under progress to identify clay minerals in the samples.

Heat Capacity and Entropy of Donor Impurity in Quantum Dot with Gaussian Confinement

NehalYahyah, Mohammad Elsaid* and KhaledIlaiwi, Marwan Alkawni
NNU

Abstract: The ground state energy of shallow donor impurity in GaAs/AlGaAs heterostructure with Gaussian potential using the shifted $1/N$ expansion method had been calculated. The effects of the impurity on the ground state energy, the dot radius R, confining potential depth V_0 and dimension N had been investigated. The impurity binding energy of the ground state has been calculated as a function of dot radius R, confining potential depth V_0 and dimension N . We had found that the impurity binding energy of the ground state increases as confining potential depth V_0 increases while it decreases as dot radius R and dimension N increases . In addition, we had also computed the heat capacity C_v and entropy S of donor impurity in QD and investigated the dependence of these quantities on dot radius R, confining potential depth V_0, dimension N and temperature T. The comparison shows that our results are in very good agreement with the reported work.

ZnSe/MoO_3heterojunction and their characterization

Hadeel M. Zyoud, A. F. Qasrawi

AAUJ

Abstract : In this work the structural and optical properties of ZnSe/MoO_3 thin film are investigated by means of X-ray diffraction and UV spectrophotometer in the incident wavelength range of 300-1100 nm. While the ZnSe substrate is observed to exhibit polycrystalline nature and the MoO3exhibit amorphous nature, the double junction doesn't alter the structural properties. On the other hand the analysis of the optical transmission and reflectance spectra allowed determining the energy band gaps as well as the energy band offsets. While the conduction band exhibited an offset value of 0.1 eV, the valence band exhibited a value of 0.8 eV. In the light of these parameters, the energy band diagram designed and presented. The band diagram displayed features that allow the quantum confinement which is set as a reason for the observed enhancement in absorption ratio.