IWDSA-2019

International Workshop on Dynamical Systems and Applications:

In Memory of Prof. Dr. Aydın Tiryaki

May 3-4, 2019 in Ankara, TURKEY

Book of Abstracts

http://iwdsa2019.gazi.edu.tr/

IWDSA-2019

May 3-4, 2019 in Ankara, TURKEY

International Workshop on Dynamical Systems and Applications: In Memory of Prof. Dr. Aydın Tiryaki

Preface

The 2019 edition of International Workshop on Dynamical Systems and Applications (IWDSA) will honor the memory of Professor Aydın Tiryaki who passed away in May 4, 2016 at the age of 60. His students, friends and collaborators will always remember him for his teaching, his science and his charismatic personality.

This abstract booklet includes the abstracts of the papers that will be presented at the Workshop which will be held in Gazi University, Faculty of Science, 75th Year Conference Hall, Ankara, Turkey at May 3-4, 2019. This workshop honors the achievements and valuable contributions of a 40-year mathematician to the field of Differential Equations: oscillation, stability, boundedness, periodicity, Sturm theory of ordinary differential equations, Half-linear elliptic type partial differential equations, Functional differential equations: oscillation, positive solutions, Difference Equations.

The aim of this conference is to bring together leading experts and researchers in nonlinear analysis and to assess new developments, ideas and methods in this important and dynamic field. It is also a goal of the meeting to promote collaborative and networking opportunities among senior scholars and graduate students in order to advance new perspectives. The theme of the workshop is "Differential Equations and Applications". However, the talks are not restricted to this subject only. These workshops constitute the annual meetings of the series of dynamical systems seminars traditionally organized at Middle East Technical University throughout each academic year. The workshop is held every year to make it an ideal platform for people to share views and experiences in Dynamical Systems and Applications.

Some of fields covered in these presentations are Differential Equations, Dynamical Systems, Fractional Differential Equations, Dynamic Equations, Numerical Analysis, Partial Differential Equations with Applications, Fixed Point Theory, Positive Operators, Metric Spaces, etc.

We wish everyone a fruitful conference and pleasant memories from Ankara, Turkey.

A. Okay ÇELEBİ

Chairman

Biography of Prof. Dr. Aydın TİRYAKİ

Professor Aydın Tiryaki was born in Kars-Posof in 1956. He completed his primary education in Posof, his secondary education and high school in Trabzon. He obtained the B.Sc. in 1977 from the Department of Mathematics, Faculty of Sciences, Atatürk University. Dr. Tiryaki started working as a mathematics teacher at Kırıkkale High School in November 1977. One year later, in May 1978, he started to serve as a research assistant in the Department of Mathematics, Faculty of Sciences, Dicle University. In April 1979, he was transferred to the Department of Mathematics, Ankara University as a research assistant. He received the M.Sc. in 1981 and the Ph.D. in 1985, both from the Department of Mathematics, Faculty of Science, Ankara University. He served as Assistant Professor from 1986 to 1990 and Associate Professor from 1990 to 1994, both in the Department of Mathematics, Faculty of Arts and Sciences, Erciyes University. During these years, he also served as Visiting Researcher at The Abdus Salam International Centre for Theoretical Physics (ICTP) in Italy-Trieste in 1989 and at the Department of Mathematics, Udine University in Italy-Udine in 1991. In January 1994, he was appointed to the Department of Mathematics, Faculty of Science, Hacettepe University as an Associate Professor. In July 1996, Dr. Tiryaki became Full Professor in the Department of Mathematics, Faculty of Science, Hacettepe University. During the period of 1996-2000, he was a professor at the Department of Mathematics, Faculty of Science, Hacettepe University. In May 2000, he joined the Department of Mathematics, Faculty of Arts and Sciences at Gazi University as Professor, and retired from Gazi University in 2008. After that Dr. Tiryaki attended to the Department of Mathematics and Computer Science, Faculty of Sciences, İzmir University as Professor from 2008 to 2016. He served as the Vice Rector from 2008 to 2012 and the Dean of the Faculty of Sciences from 2009 to 2016, both at İzmir University.

Dr. Tiryaki, 40-year mathematician, published more than 80 important papers from 1988 to 2018 and participated in international and national conferences in his field of Differential Equations: oscillation, stability, boundedness, periodicity, Sturm theory of ordinary differential equations, Half-linear elliptic type partial differential equations, Functional differential equations: oscillation, positive solutions, Difference Equations.

Dr. Tiryaki, who raised countless M.Sc. and Ph.D. students and passed away at the age of 60 on May 4, 2016, was greatly loved and is deeply mourned by his wife Nimet Tiryaki, daughter Sibel, sons Sinan and Burak, many friends and colleagues. His students, friends and collaborators will always remember him for his teaching, his science and his charismatic personality.

Devrim ÇAKMAK

His Ph.D. Student

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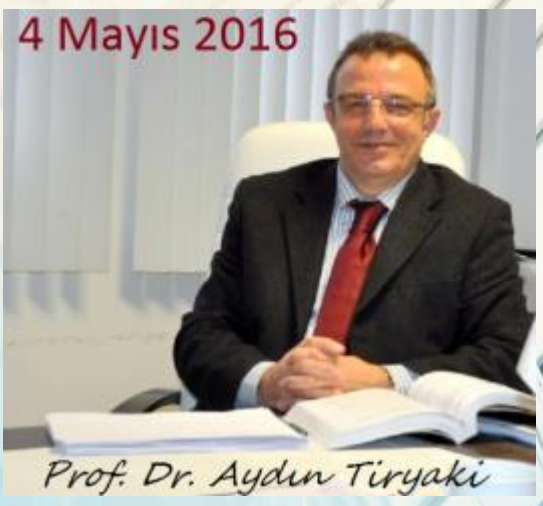
Contributed Talks



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Oscillatory behavior of damped second-order linear neutral differential equations

E. Tunç[1], A. Kaymaz[2]

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Abstract

This talk deals with the oscillatory behavior of damped second order linear neutral differential equations. Some new sufficient conditions for oscillation of solutions of the equation considered are established. Illustrating examples showing the applicability of the results are also given.

Key Words: Oscillatory behavior, Neutral differential equations, Second order.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Exponential of lateral branching, Tip-Hypha anastomosis with loss energy

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Abstract

In this talk, we will present the biological phenomenon spatially Fungi, after that Conversion these fungi biological phenomenon to mathematical system as system of partial differential equations (PDEs). This method saves time, effort and money. Here we will illustrate the growth of fungi from type Lateral branching, Tip-hypha anastomosis with Loss Energy like salts or phosphate are feeding on the fungi, this salts and phosphate are loosed relatively for example maybe zero when the fungi is died or some relative until consumed all these slates and phosphate this mean complete relative 100%, that is mean is equal one.

Key Words: Lateral tip-hypha, Anastomosis and hyphal.

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Structural stability for the g-Kelvin Voight equations

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Abstract

The Structural stability results represent us the impact of small changes in coefficients of equations on the solutions. In this talk, we presents structural stability for the g-Kelvin Voight equations.

Key Words: Structural stability, g-Kelvin Voight equations.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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A meshless method for the coupled nonlinear Schrödinger equations

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[2] *Eskişehir Technical University, Eskişehir, Turkey, ydereli@eskisehir.edu.tr*

Abstract

In this talk, a meshfree method based on Kansa's approach is studied to obtain numerically solutions of the coupled nonlinear Schrödinger (CNLS) equations. Forward difference and Crank-Nicolson methods are used for the temporal and spatial discretization, respectively. The stability analysis of the proposed method is investigated by using Von-Neumann stability technique for the governing equations. Moreover, all obtained numerical results are presented in tables and figures. The obtained numerical experiments are compared with analytical solutions to confirm the accuracy and efficiency of the suggested scheme.

Key Words: Kansa's method, Coupled nonlinear Schrödinger equations, Von-Neumann stability.

References

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On Bennet-Leindler type dynamic inequalities

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Abstract

This presentation will serve as a survey of the Hardy, Copson, and its converses, which are Bennet, and Leindler type inequalities in the classical continuous, discrete cases as well as their time scales developments in the delta calculus set-up. Nabla time scale versions of these results, recently obtained by the authors, will also be given. Finally, an attempt of a proposition will be made in the more general dynamic inequalities sense of the above mentioned cases, by use of the diamond-alpha type integrals, so that all of the aforementioned results may be obtained as consequences of this most general set-up of time scale calculus.

Key Words: Bennet and Leindler type inequalities.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Oscillation theorems for second-order nonlinear differential equations with impulsive effects

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Abstract

By using classical variational principle and averaging technique, several oscillation criteria are established for nonlinear second-order equation of the form in which an impulsive effect

$$\left[r(t)\Phi\left(x(t)\right)\varphi\left(x'(t)\right)\right]' + a(t)\varphi\left(x(t)\right) = 0,$$

where $r \in C\left(\left[t_0,\infty\right);\left[0,\infty\right)\right), a \in C\left(\left[t_0,\infty\right);\mathbb{R}\right), \Phi \in C\left(\mathbb{R};\mathbb{R}\right)$ and $\varphi : \mathbb{R} \to \mathbb{R}$ is defined by $\varphi(s) = |s|^{p-2}s$ with $p > 1$ is a fixed real number. This equation can be regarded as an equation of motion in which the moving speed of a mass point may oscillate due to the influence of impulsive effect even if the mass point does not oscillate in the model removing the impulsive effect. It is also shown that the obtained results extend some previous criteria.

Key Words: Oscillation problem, Impulse, Averaging technique, Riccati transformation.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Why new fractional calculus?

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[2] *Institute of Space Sciences, Magurele-Bucharest, Romania*

Abstract

Fractional calculus is an emerging field of mathematics and it has many valuable applications in several branches of science and engineering [1]. Recently, the new fractional calculus was proposed and it was based on the Mittag-Leffler kernel [2] instead of the traditional one. In this talk, I will present the advantages of this new type of fractional calculus and well as some related applications in Mathematical Biology.

Key Words: Fractional calculus, New fractional operators, Atangana-Baleanu fractional derivative.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Optimality conditions of set-valued optimization problems with respect to ℓ_1 order relation by using oriented function

E. Karaman

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Abstract

In this study, set-valued optimization problems are considered with respect to ℓ_1 order relation, which is a pre-order relation on the family of nonempty sets. Recently, Oriented distance function has been used to obtain scalarization of set-valued optimization problems [1]. Some relationships between an extension of Oriented distance function and ℓ_1 order relation are examined. By using Oriented distance function, some necessary and sufficient optimality conditions are obtained for set-valued optimization problems given with respect to ℓ_1 order relation.

Key Words: Set-valued optimization, Optimality condition, Oriented distance function.

References

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Explosive solutions for a nonlinear integro-differential equations with variable exponents

E. Piskin

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Abstract

In this talk, we consider a nonlinear integro-differential equations with variable exponents. Firstly, we give information the Sobolev and Lebesgue spaces with variable exponents (see [1, 4]). Later, we prove nonexistence of global solutions under suitable conditions. Our result extends a previous nonexistence result in [2, 3].

Key Words: Integro-differential equations, Nonexistence, Variable exponents.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
In Memory of Prof. Dr. Aydın Tiryaki
Gazi University, Ankara, Turkey, 3-4 May 2019

Decay of solutions for a system of higher-order wave equations[1]

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Abstract

In this talk, we consider a nonlinear higher-order wave equations with damping terms. We will prove decay of solutions under suitable conditions. Our result extends a previous result in [1, 2].

Key Words: Integro-differential equations, Nonexistence, Variable exponents.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Solvability of infinite system of second-order differential equations

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Abstract

In this talk, we present existence results for the solution of infinite systems of second order

$$\frac{d^2u_i}{dt^2} = -f_i\left(t, u_1, u_2, u_3, ...\right);\ u_i\left(T\right) = 0,\ t \in [0, T]$$

differential equations in Banach sequence spaces c_0 and l_1 using the idea of Meir-Keeler condensing operators. We also give some examples to illustrate our results in these sequence spaces.

Key Words: Meir-Keeler condensing operator, Infinite system of second order differential equation.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Riesz spaces with disjoint b-property

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Abstract

In this study, it is introduced the Riesz Spaces with disjoint b- property and given some examples of these spaces. And then it is proved that the Riesz space $L_b(E,F)$ has disjoint b- property if the Riesz space F has disjoint b- property for each Riesz spaces E.

Key Words: Positive operators, Riesz spaces, Riesz spaces with disjoint b-property.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Generalization of Szasz-Schurer operators of two variables

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Abstract

In this study, two variable generalization of Szasz-Schurer operators was given and the approximation properties and the rate of convergence of these operators were investigated.

Key Words: Szasz-Schurer operators, The rate of convergence, The approximation properties.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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The spectra of the graph with using k-th power of a graph

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Abstract

A graph G consists of a set $V = \{v_1, v_2, v_3 ...\}$ called vertices and other set $E = \{e_1, e_2, e_3 ...\}$ whose elements are called edges. Usually the graph is denoted as $G = (V, E)$. A tree is an undirected graph in which any two vertices are connected by exactly one path. The path graph is a tree with two nodes of vertex degree 1, and the other nodes of vertex degree 2. A path graph is therefore a graph that can be drawn so that all of its vertices and edges lie on a single straight line. Star graph is a special type of graph in which $n-1$ vertices have degree 1 and a single vertex have degree $n-1$. The cycle C_n, $n \geq 3$, consists of n vertices v_1, v_2, v_3 ..., v_n and edges $\{v_1, v_2\}$, $\{v_2, v_3\}$,...$\{v_{n-1}, v_n\}$ and $\{v_n, v_1\}$. The complement or inverse of a graph G is a graph $\overline{G}$ on the same vertices such that two distinct vertices of $\overline{G}$ are adjacent if and only if they are not adjacent in G. The $k-th$ power G^k of a graph G is a graph with the same vertex V such that two vertices are adjacent in G^k iff their distance in G is at most k. The adjacency matrix of G^k is denoted by A^k. The adjacency matrix of G^k is defined by its entries $a_{ij} = 1$ if $i \sim_k j$ and 0 otherwise. The eigenvalues of A^k are denoted by $\lambda_1^{(k)} \geq \lambda_2^{(k)} \geq ... \geq \lambda_{n-1}^{(k)} \geq \lambda_n^{(k)}$.

In this talk,we give new theorem for the spectra of a graph, using $k-$th power of a graph . For any graph G of order n,

$$\begin{aligned} 0 &\leq \sqrt[k]{\lambda_1(G^k)} \leq ... \leq \sqrt[3]{\lambda_1(G^3)} \leq \sqrt[2]{\lambda_1(G^2)} \\ &\leq \lambda_1(G) \leq \sqrt[k]{\lambda_1(G^k)} + \sqrt[k]{\lambda_1(\overline{G}^k)} \leq ... \\ &\leq \sqrt[3]{\lambda_1(G^3)} + \sqrt[3]{\lambda_1(\overline{G}^3)} \leq \sqrt[2]{\lambda_1(G^2)} + \sqrt[2]{\lambda_1(\overline{G}^2)} \end{aligned}$$

shaped is a decreasing sequence.

Key Words: k-th power of a graph, Spectra of the graph.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On soft fuzzy metric spaces

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Abstract

Lots of our traditional tools for formal modelling, reasoning and computing are crisp. Crisp mean dichotomous, that is yes-or-no type rather than more-or-less type. In traditional dual logic, for instance, a statement can be true or false and nothing in between. However, in daily life the problems in many fields such as engineering, physics, computer sciences, economies, social sciences,medical sciences and many other diverse fields deal with uncertain data and that may not be successfully modelled by the classical methods. To solve this kinds of problems, there are theories such as; theory of probability, theory of fuzzy sets, theory of intuitionistic fuzzy sets and theory of interval mathematics. The most appropriate theory, for dealing with uncertainties is the theory of fuzzy sets introduced by Zadeh [7]. But the fuzzy set operations based on the arithmetic operation, for this reason in 1999, Molodtsov [5] showed a new mathematical tool for dealing with uncertainties which is free of the difficulties. This so-called soft set theory.

A soft set is a parameterized family of subsets of the universal set. Research work in soft set theory have been progressing rapidly since Maji et al. [4] introduced several operations on soft sets and applied it to desicion making problems. Then, Das and Samanta [3] initiated soft metric spaces and investigated some basic properties. For other some study see [1, 2, 6].

In this study, we introduce soft fuzzy metric spaces and examine some topological structures such as countability, convergence, separability, completeness etc.

Key Words: Soft set, Soft fuzzy metric.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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The boundedness of a class of fractional type rough higher order commutators on vanishing generalized weighted Morrey spaces

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Abstract

Let $\Omega \in L_s(S^{n-1})$, $1 < s \leq \infty$. Ω is the function defined on $\mathbb{R}^n \setminus \{0\}$ satisfying the homogeneous of degree zero condition, that is,

$$\Omega(\lambda x) = \Omega(x) \text{ for any } \lambda > 0,\ x \in \mathbb{R}^n \setminus \{0\}$$

and the integral zero property (=the vanishing moment condition) over the unit sphere S^{n-1}, that is,

$$\int\limits_{S^{n-1}} \Omega(x')d\sigma(x') = 0,$$

where $x' = \frac{x}{|x|}$ for any $x \neq 0$.

In this talk, we consider the following higher order (= k-th order) commutator operators of rough fractional integral and maximal operators,

$$\begin{aligned} T_{\Omega,\alpha}^{A,k} f(x) &= T_{\Omega,\alpha}\left(\left(A(x) - A(\cdot)\right)^k f(\cdot)\right)(x), \qquad k = 0, 1, 2, \ldots, \\ &= \int\limits_{\mathbb{R}^n} \frac{\Omega(x-y)}{|x-y|^{n-\alpha}} \left(A(x) - A(y)\right)^k f(y)dy \end{aligned}$$

and

$$\begin{aligned} M_{\Omega,\alpha}^{A,k} f(x) &= M_{\Omega,\alpha}\left(\left(A(x) - A(\cdot)\right)^k f(\cdot)\right)(x), \qquad k = 0, 1, 2, \ldots, \\ &= \sup_{r>0} \frac{1}{r^{n-\alpha}} \int\limits_{|x-y|<r} |\Omega(x-y)| \left|A(x) - A(y)\right|^k |f(y)|\, dy. \end{aligned}$$

Inspired of [1], the aim of the present paper is to study the boundedness of the operators $T_{\Omega,\alpha}^{A,k}$ and $M_{\Omega,\alpha}^{A,k}$ generated by $T_{\Omega,\alpha}$ and $M_{\Omega,\alpha}$ with a BMO functions on vanishing generalized weighted Morrey spaces, respectively. That is, in this study we will consider this problem.

Key Words: Fractional type higher order (= k-th order) commutator operators, Rough kernel, $A\left(\frac{p}{s'}, \frac{q}{s'}\right)$ weight, Vanishing generalized weighted Morrey space.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

State prediction and parameter identification in stochastic State-Space models with time-invariant parameters

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Abstract

A State-Space Model is a mathematical model of a system as a set of input, output and state variables related by first-order differential equations or difference equations. State variables are variables whose values evolve through time in a way that depends on the values they have at any given time and also depends on the externally imposed values of input variables. Space variables values depend on the values of the state variables. State-Space Models are the most commonly used models in almost every area. State prediction concerns statistical inference for the state, based on noisy data coming from partial or indirect measurement access to state variables. Prediction procedure is nicely carried out by the Kalman Filter. Parameters in the state equation must have known values, which are some natural time-invariant constants related to phenomena under study. Sometimes there may exist unknown state parameters, which must be identified. The parameter identification problem can be solved by Kalman Filter via state augmentation. State augmentation results in a nonlinear state equation calling the Extended Kalman Filter (EKF) as an estimation device. The both problems of state prediction and parameter identification are solving simultaneously by EKF. In this study the capabilities of EKF in state prediction and identification of time-invariant unknown parameters are evaluated by simulation.

Key Words: State-Space Model, Estimation, Prediction, Kalman Filter.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

State prediction and parameter identification in stochastic linear State-Space models with time-variant parameters

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Abstract

The Kalman filter is an efficient recursive filter that estimates the internal state of a Linear Dynamic System from a series of noisy measurements. It is used in a wide range of engineering and econometric applications from radar and computer vision to estimation of structural macroeconomic models. Generally, parameters in the state equation have known static values, which are some natural constants related to phenomena under study. When there exist unknown, time-invariant state parameters, they must be identified. This problem can be solved by Kalman Filter via state augmentation. What can we do when some parameters in the state equation are unknown and time-variant. When the dynamic underlying the parametric variation is a known function of time, then it can be integrated with the state dynamic, simply by augmentation. What can we do when some unknown state parameters appear randomly from a known static distribution. This study dwell on the problem of state prediction and identification of unknown time-variant parameters.

Key Words: State-Space Model, Estimation, Prediction, Kalman Filter.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
In Memory of Prof. Dr. Aydın Tiryaki
Gazi University, Ankara, Turkey, 3-4 May 2019

On the construction a topology on a monoid and a group using prefilters

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Abstract

A map f of the product $X \times Y$ of topological spaces X and Y into a topological space Z is said to be separetely continuous if, for each (x_0, y_0) in $X \times Y$, the maps $g : X \to Z$; $g(x) = f(x, y_0)$ and $h : Y \to Z$; $h(y) = f(x_0, y)$ are continuous. When f is continuos at (x_0, y_0) relative to the product topology, we say that f is jointly continuos at (x_0, y_0).

A semigroup (monoid, group, respectively) $(S, \cdot)$ equipped with a topology τ is called a topologized semigroup (monoid, group respectively). A topologized group $(G, \cdot, \tau)$ is semitopological group (paratopological group respectively) if the group operation $(x, y) \to x \cdot y$ from $G \times G \to G$ is separetely (resp., jointly) continuous mapping. A paratopological group G in which the mapping $x \to x^{-1}$ from G to G is continuos called a topological group.

In this talk, we will present a way of constructing a topology on a monoid M using prefilter, with this topology, M becomes right topological monoid and all right translations are open. Essentially using the construction we can make semitopologize or paratopologize many Abelian groups. However, to make a group into a topological group is much more complicated matter. We also present some conditions on mentioned prefilters to guarantee that the topology, defined in this construction, on an infinite absract group will turn G into a Hausdorff topological group.

Key Words: Monoid, Semi-topological group, Paratopological group, Prefilter.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
In Memory of Prof. Dr. Aydın Tiryaki
Gazi University, Ankara, Turkey, 3-4 May 2019

Asymptotic iteration technique and it's applications

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Abstract

In this talk, I have introduced the asymptotic iteration method (AIM) for second order, linear and homogen differential equations and given some examples for eigenvalue problems. I have used AIM for obtaining the criterion for the polynomial solutions for the second order, linear and homogen differential equations. Additionally, I have also shown how to use AIM for first order, linear differential equation systems and perturbation problems in physics.

Key Words: Asymptotic iteration method, Differential equations.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Two problems in the theory of disjointness preserving operators

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Abstract

Let G and H be Riesz spaces. An operator $S : G \to H$ is called *disjointness preserving* if $Sx \perp Sy$ for all $x, y \in G$ satisfying $x \perp y$ (i.e., $|x| \wedge |y| = 0$). In this talk, our aim is to solve two problems in the theory of disjointnesss preserving operators. Firstly, we obtain the converse direction of Hart's Theorem which was given in [3]. As a result, we get affirmative solution of the open problem given by Abramovich and Kitover in [1] .

Key Words: Riesz space, Disjointness preserving operator.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Approximation by parametric extension of Baskakov-Durrmeyer type operators

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Abstract

In this study, the approximation properties of parametric extension of Baskakov-Durrmeyer type operators sequence, studied [1] and [2], were investigated. The uniform convergence of these operators in the sense of Korovkin type theorem proven. Also with the help of continuity module, a rate of approximation degree is given.

Key Words: Baskakov Durrmeyer type operators, Modulus of continuity, Rate of convergence.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Iterates of the Bernstein type max-product operators

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Abstract

In this talk, we consider fixed points and iterates for the Bernstein type max-product operators. We study the convergence of the iterates of operators. Some approximation properties are compared with the iterates of Bernstein polynomials.

Key Words: Iterates, Max-product operators, Bernstein polynomials.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On linear positive operators preserving exponential functions

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Abstract

This presentation deals with construction of the well-known linear positive operators which preserve constant and exponential functions. After that, we show the rate of convergence by using the modulus of continuity and investigate a quantitative Voronovskaya-type theorem. Finally, we illustrate the convergence behaviour of the constructed operators with the selected function f by using MATLAB.

Key Words: Exponential functions, Modulus of continuity, Voronovskaya-type theorem.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Blow-up of solutions of nonlinear Pseudo-Parabolic equations

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Abstract

In this talk, we present the studies about the blow-up of solutions of pseudo-parabolic problems starting from the following equation which was called the first time as a pseudo-parabolic equation by Showalter and Ting in 1970,

$$u_t - \Delta u_t - \nu \Delta u = 0, \ \nu > 0,$$

and represents a subclass of equations of Sobolev type equations. We also analyze the following initial boundary value problem in a bounded domain $\Omega \in \mathbb{R}^n$ and give the sufficient conditions for the blow-up of solutions and the lower and upper bounds for the blow-up time if blow-up happens,

$$u_t - \Delta u_t - \Delta u - u^m u_{x_1} + g(t, x, u, \nabla u) = |u|^{m_1} u, \quad x \in \Omega, \quad t > 0,$$

Key Words: Pseudo-parabolic equation, Sobolev equation, Lower bound, Upper bound.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Effect hyphal death on FHXW branching type with energy

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Abstract

In this talk, we will present a phenomenon of fugal growth which describes by mathematical model, that is model illustrate behavior for growth of Dichotomous branching, Lateral branching, Tip-hypha anastomosis, Tip-tip anastomosis, Tip death, Tip death due to overcrowding with hyphal death and we show the consumption energy. In general, we know the growth of fungi need to Cost, effort and money, so we come to a mathematical solution, to shorten the time, cost, and effort to get the right decision even though there is error ratio. In this paper we will take mathematical model using solution of system partial differential equations (PDEs). The results of this solution will be describing a success or failure of the growth of the fungus species studied, and we used some codes in numerical analysis because some difficulty in direct mathematical solution.

Key Words: Yphal death, Dichotomous branching, Lateral branching, Tip-hypha anastomosis, Tip-tip anastomosis.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Periodic point results on orthogonal cone metric space

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Abstract

In 2007, Huang and Zhang [3] introduced cone metric spaces and proved some fixed point theorems of contractive mappings on cone metric spaces. Then many researchers are obtained fixed point theorems on cone metric spaces.
On the other hand, in 2017, Gordji et al [2] described the notion of orthogonal set and orthogonal metric spaces. Generalizations of theorems in this field have been considered in some research articles.
Very recently, Bilgili Gungor [1] presented new concepts of orthogonal cone metric spaces, orthogonal completeness and orthogonal continuity. Also, fixed points of orthogonal contractions are investigated by Bilgili Gungor. In this work, periodic points of self mappings which are defined on orthogonal cone metric spaces are investigated.

Key Words: Orthogonal cone metric, Fixed points, Periodic points.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Oscillation results for second order neutral dynamic equations on time scales

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Abstract

In this talk, we discuss oscillatory behavior to a class of second-order neutral dynamic equations containing mixed nonlinearities on an arbitrary time scale $\mathbb{T}$. Using a Riccati-type transformation and the arithmetic-geometric mean inequality, we present some new sufficient conditions which ensure that all solutions of the studied equation are oscillatory. The results obtained improve and complement some known results in the literature. An example is given to illustrate the results.

Key Words: Oscillation, Neutral, Second order, Dynamic equations on time scales.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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The concept of Hukuhara derivative and Aumann integral for intuitionistic fuzzy number valued function

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Abstract

In this talk we will firstly define a new metric in intuitionistic fuzzy environment and study its properties. Then we will show that the metric space of fuzzy number valued functions is complete under this metric. Lastly, we will study the concept of the Aumann integration for intuitionistic fuzzy number valued functions in terms of α and β cuts. And we will give the proof of the relation between Hukuhara derivative and Aumann integral for intuitionistic fuzzy valued functions by using the fundamental theorem of calculus.

In science and technology, vagueness or ambiguity is an inevitable phenomena. Hence to understand and interpret the models containing elements of uncertainty, probabilistic or possibilistic approaches are developed. Generally, the possibilistic approaches are based on fuzzy set theory which was introduced by L. A. Zadeh in 1965 [1].

In 1986, Atanassov introduced the concept of intuitionistic fuzzy sets (IFS) and carried out rigorous researches to develop the theory [2]. In this set concept, he introduced a new degree $\nu : X \to [0, 1]$, called non-membership function, such that the sum $\mu + \nu$ is less than or equal to 1. Hence the difference $1 - (\mu + \nu)$ is regarded as degree of hesitation. In applications of fuzzy sets or intuitionistic fuzzy numbers generally α or β which are compact and convex sets are used. However, in those applications there is a problem : The inverse element of a compact and convex set with respect to Minkowski sum does not always exists. That is, if $A = \{a\}$ is not a singleton set, the Minkowski sum of A and $-A$ is not always the identity element $\{0\}$ i.e., $A + (-1)A \neq \{0\}$. Hence this is a drawback not only in theory of compact and convex sets but also in theory of fuzzy sets and IFS. That is why Hukuhara tried to handle the inverse element problem. He defined a new difference called Hukuhara difference (H-difference) for compact and convex sets [3]. Later Hukuhara difference of fuzzy sets and Hukuhara derivative (H-derivative) of fuzzy number valued functions were introduced and studied.

The concept of fuzzy integral was firstly defined by Sugeno [4]. Later Ralescu and Adams defined the fuzzy integral of positive measurable functions [5]. They studied some properties such as monotone convergence theorem and Fatou's lemma. Later Dubois and Parade generalized the Riemann integral over compact and convex sets to fuzzy valued functions [6]. This approach is mainly related with the concept of Aumann integral. Aumann integral is defined for set valued functions by Aumann [7]. Since a fuzzy-valued function is essentially a family of set-valued functions, fuzzy Aumann integration concept is employed in the concept of fuzzy integral and fuzzy differential equations.

Key Words: Intuitionistic fuzzy sets, Intuitionistic fuzzy number valued functions, Hukuhara derivative, Aumann integral, Intuitionistic Hausdorff metric.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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A class of generating functions for some polynomials

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Abstract

The present study deals with some new properties for some generalized polynomials. The results obtained here include various families of multilinear and multilateral generating functions, miscellaneous properties and also some special cases for these polynomials.

Key Words: Generating function, Recurrence relation, Hypergeometric function, Pochhammer symbol.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Oscillation criteria for a certain second-order nonlinear perturbed differential equations

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Abstract

In this paper, a class of second order nonlinear perturbed differential equation and its special cases are studied. By using the generalised Riccati transformation and well-known techniques, some new oscillation criteria are established. The results obtained essentially generalize and improve some known results and can be applied to the well-known half-linear and damped half-linear type differential equations.

Key Words: Half-linear differential equation, Oscillation, Riccati transformation.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On a new Vallée Poussin type inequality for linear differential equations under impulse effect

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Abstract

In this talk, we will deal with the derivation of a Vallée Poussin inequality for linear impulsive differential equations of general type.

The classical Vallée Poussin inequality dates back to 1929 [1], but it took a long time to appear the generalizations of the inequality. Its improvements in various directions have been obtained by some authors, see for instance [2-5]. Still, to the best of our knowledge, any generalization for differential equations under impulse effect has not appeared in the literature. Motivated by the reasons mentioned above we studied a general type of linear impulsive differential equations to obtain a Vallée Poussin inequality. When the impulse effects dropped our results reduce to the classical Vallée Poussin inequality given in [1], and also to its improvements obtained by Hartman and Wintner in [2].

Key Words: Vallée Poussin inequality, Impulsive differential equation, Green's function.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Oscillation results for a certain type elliptic equation by using a suitable Picone-type inequality

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Abstract

Picone-type inequalities are very useful tools to establish oscillation theorems for partial differential equations. In this talk, we establish a Picone-type inequality for a certain type nonlinear elliptic equation in order to give an oscilation result. Moreover we derive some oscillation results by reducing the half linear partial differential equations to half linear ordinary differential equations.

Key Words: Picone's inequality, Elliptic equations, Oscillation criteria.

References

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On the stability problem of differential equations in the sense of Ulam

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Abstract

In this paper we consider the stability problem of a general class of differential equations in the sense of Hyers-Ulam and Hyers-Ulam-Rassias with the aid of a fixed point technique. We extend and improve the literature by dropping some assumptions of some well known and commonly cited results in this topic, such as [1]. Some illustrative examples are also given to visualize the improvement.

Key Words: Differential equations, Stability theory, Hyers-Ulam-Rassias stability, Fixed point theory, Generalized metric spaces.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Optimal pollution control for a waterborne pathogen model

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Abstract

In this talk, a waterborne pathogen model is studied due to an increase in the number of deaths caused by water-related illnesses in the world [1]. The model is constructed by dividing the population into three groups, namely, susceptible, infected and recovered compartments. Here, we include the effect of stressors, since pollution can be caused by lack of clean water and hygienic conditions. Indeed, 5% of health care facilities in low and middle-income countries do not have water and soap, and half of the world's population is predicted to live in water-stressed zones by 2025 [2]. We extend a model with a time fractional derivative to include non-local effects of pollution [3]. We investigate some suitable policies to reduce the reproduction number associated with the model. Specifically, the decay rate of pathogens and the stress related parameters are optimized in order to minimize the number of infected individuals and reduce the pathogen population in size. At the end, we present some numerical results to find out the most appropriate control policies and the impact of the fractional order derivative.

Key Words: Optimal control, Waterborne pathogen model, Stability, Stress.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

On asymptotic integration of second-order delay differential equations

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Abstract

In this work, we study the asymptotic integration problem for second-order nonlinear delay differential equations of the form $((p(t)x'(t))'+q(t)x(t) = f(t, x(g(t)))$. It is shown that solutions are asymptotic to prescribed solutions of the associated linear homogeneous equation $((p(t)x'(t))' + q(t)x(t) = 0$ at infinity.

Key Words: Delay differential equation, Asymptotic integration, Fixed point theory, Principal solutions.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Optimal control of stochastic differential equations and optimality conditions

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Abstract

In this talk, optimal control problems of the stochastic differential equations is considered. Firstly, we formalize the problem. We introduce the model problem. Then, in order to solve the optimization problem we obtain the optimality conditions. An efficient gradient method is used to obtain the optimality system. As a numerical example, a financial mathematical model is considered.

Key Words: Optimal control, Stochastic differential equation.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Gazi University, Ankara, Turkey, 3-4 May 2019

Oscillation results for second order matrix differential equations with damping

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Abstract

By using the positive linear functional, including the general means and Riccati technique, some new oscillation criteria are established for the second order matrix differential equations

$$(r(t)P(t)\psi(X(t))K(X(t))) + p(t)R(t)\psi(X(t))K(X(t))$$
$$+Q(t)F(X(t))G(X(t)) = 0, t \geq t_0 \geq 0.$$

The results improve and generalize those given in some previous papers, such as Li and Agarwal [1], Yang and Tang [2] and Yang [3, 4].

Key Words: Matrix differential system, Oscillation, Damping term, Wintner type oscillation.

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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On distribution of zeros of first order delay differential equations

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Abstract

The aim of this talk is to introduce some results on the distribution of zeros of first-order linear delay differential equations. The particular emphasis will be on the lower bounds of the distance between consecutive zeros of the equation. One can review [1] to see the subject in detail.

Key Words: First-order delay differential equations, Lower bounds.

References

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International Workshop on Dynamical Systems and Applications (IWDSA 2019)
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Disconjugacy via Lyapunov type inequality for linear discrete Hamiltonian systems

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Abstract

In this talk, a disconjugacy criterion is obtained for the general linear discrete Hamiltonian systems by using a new Lyapunov type inequality. Our result is novel and generalizes the previous related results in the literature particularly the ones obtained for planar discrete Hamiltonian systems.

Key Words: Disconjugacy, Discrete Hamiltonian systems, Lyapunov type inequality.

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Rsc. Assist. Dr.	Şule Yüksel Güngör	Gazi University
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Student	Aytekin Enver	Gazi University
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