Abstracts
11th International Conference on Fixed Point Theory and Its Applications

Galatasaray University
Istanbul, TURKEY

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Preface

This abstract booklet includes the abstracts of the papers presented at the 11th International Conference on Fixed Point Theory and its Applications (11th ICFPTA - 2015), held at Galatasaray University during July 20-24, 2015.

The aim of this conference is to bring together leading experts and researchers in nonlinear analysis and in particular, fixed point theory with its applications 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. Additional emphasis at ICFPTA-2015 is put on applications in related areas, as well as other sciences, such as the natural sciences, economics, computer sciences and various engineering sciences. The papers presented in this conference will be considered for publication with reduced rate, subject to peer review, in the conference proceeding by *Yokohama Publishers* and as a Special Issue of the journal *Fixed Point Theory and Applications*.

The conference brings together more than 160 participants from 25 countries (Algeria, Australia, Canada, China, Germany, India, Iran, Japan, Mexico, Oman, Pakistan, Poland, Romania, Russia, Saudi Arabia, Serbia, South Africa, South Korea, Spain, Taiwan, Thailand, Tunisia, Turkey, United Arab Emirates, USA), out of which 138 are contributing to the meeting with oral and 14 with poster presentations, including four Plenary talks. Some fields covered in these presentations include Fixed Point Theory, Dynamical Systems, Fractional Differential Equations, Dynamic Equations, Numerical Analysis, Modeling, and PDEs with applications.

The conference organizers are grateful to Nonlinear Analysis and Applied Mathematics Research Group (NAAM), King Abdulaziz University, Saudi Arabia, Atılım University, Ankara, Turkey for their financial support and to Galatasaray University for providing the beautiful conference venue.

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

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Plenary Talks

Upper and lower solution method for nth order BVPs on an infinite interval

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This work is devoted to study a nth order ordinary differential equation on a half-line with Sturm-Liouville boundary conditions. The existence results of a solution and triple solutions are established by employing a generalized version of the upper and lower solution method, Schäuder fixed point theorem, and topological degree theory. In our problem the nonlinearity depends on derivatives, and we allow solutions to be unbounded, which is an extra interesting feature. To demonstrate the usefulness of our results we illustrate two examples.

Metric fixed point theory - a retrospective

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The emphasis of this talk will be on the historical origins of metric fixed point theory, dating back over fifty years. We will discuss some fundamental problems that have been solved, and other questions that remain open. We will also discuss some new ideas that have arisen from the foundational (logical) aspects of the theory, and some of the current trends. The talk will be largely expository.

Iterative methods for split common fixed point problems in Banach spaces

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Let H_1 and H_2 be two real Hilbert spaces. Let D and Q be nonempty, closed and convex subsets of H_1 and H_2, respectively. Let $A : H_1 \to H_2$ be a bounded linear operator. Then the *split feasibility problem* is to find $z \in H_1$ such that $z \in D \cap A^{-1}Q$. Recently, Byrne, Censor, Gibali and Reich also considered the following problem: Given set-valued mappings $A_i : H_1 \to 2^{H_1}$, $1 \le i \le m$, and $B_j : H_2 \to 2^{H_2}$, $1 \le j \le n$, respectively, and bounded linear operators $T_j : H_1 \to H_2$, $1 \le j \le n$, the *split common null point problem* is to find a point $z \in H_1$ such that

$$z \in \left(\bigcap_{i=1}^{m} A_i^{-1}0\right) \cap \left(\bigcap_{j=1}^{n} T_j^{-1}(B_j^{-1}0)\right),$$

where $A_i^{-1}0$ and $B_j^{-1}0$ are null point sets of A_i and B_j, respectively. Defining $U = A^*(I - P_Q)A$ in the split feasibility problem, we have that $U : H_1 \to H_1$ is an inverse strongly monotone operator, where A^* is the adjoint operator of A and P_Q is the metric projection of H_2 onto Q. Furthermore, if $D \cap A^{-1}Q$ is nonempty, then $z \in D \cap A^{-1}Q$ is equivalent to

$$z = P_D(I - \lambda A^*(I - P_Q)A)z, \tag{1}$$

where $\lambda > 0$ and P_D is the metric projection of H_1 onto D. By using such results regarding nonlinear operators and fixed points, many authors have studied the split feasibility problem and the split common null point problem in Hilbert spaces.

In this talk, motivated by iterative methods for split feasibility problems and split common null point problems in Hilbert spaces, we consider split common fixed point problems in Banach spaces. Then, using geometry of Banach spaces, we establish weak and strong convergence theorems for split common fixed point problems in Banach spaces. It seems that such theorems are first in Banach spaces.

Keywords and phrases: Maximal monotone operator, fixed point, split common fixed point problem, metric projection, metric resolvent, iteration procedure, duality mapping.

Fixed point algorithms for compressed sensing

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Compressed sensing (CS), essentially invented by Candes, Donoho, and Tao, is a novel sampling method for recovering a sparse signal at a sampling rate that is significantly lower than the well established Nyquist rate, and finds applications in various applied areas such as statistics, engineering, medical imaging, and machine learning. CS has therefore been paid much attention recently. A key step of CS is to solve a nonconvex/convex optimization problem, and the success of CS lies in the ℓ_1 magic which says that a nonconvex ℓ_0 minimization is reduced to a convex ℓ_1 minimization provided the sensing matrix satisfies certain properties such as the restricted isometry property.

The purpose of this talk is to present some fixed point algorithms that solve optimization problems arising from CS, including the iterative hard/soft thresholding algorithms, and the proximal-projection algorithm.

Contributed Talks

The fixed point crossover theory in the description of the thermodynamic properties of fluids in the critical region

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The modern theoretical description of systems close to the critical point is based on the renormalization-group theory (RG). Different physical systems with the same space dimensionality d, and the same number of components of the order parameter can be grouped within the same universality class. Based on earlier work of Nicoll and coworkers, a crossover model has been developed to represent the thermodynamic properties of fluids in the critical region. The crossover model is based on the renormalization- group theory of critical phenomena. The 61510;4 coupling constant used in the Landau model is applied to construct a Helmholtz-free-energy density at the fixed point by analogy to the liquid-vapor transition critical point in order to describe the thermodynamic properties of several fluids, such as CO_2, n-hexane, argon.

Cauchy sequences and fixed point theorems in generalized metric spaces

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In this talk, first, we present a characterization of Cauchy sequences in generalized metric spaces. Then, using this characterization, we give fixed point theorems of Meir-Keeler type (and, more generally, of Ćirić-Matkowski type) in generalized metric spaces. Our method is simple and efficient so that it can be applied to prove fixed point theorems in generalized metric spaces analogue to those of Proinov [3].

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Multivalued F-contractive mappings with a graph

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In this paper we introduce a new type contraction, that is, multivalued F-G-contraction, on a metric space with a graph and establish some fixed point results. At the end, we give an illustrative example, which shows the importance of graph on the contractive condition.

On Caputo type fractional-order boundary value problems with nonlocal multipoint-strip conditions

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We investigate the existence of solutions for one-dimensional higher-order semi-linear fractional differential equations supplemented with nonlocal multipoint-strip conditions involving first-order derivative of the unknown function. The nonlocal multipoint-strip condition connects the linear combination of nonlocal values of the first-order derivative of the unknown function with its average value over a strip of an arbitrary size. Existence and uniqueness results for the given problem are obtained via appropriate fixed point theorems. Some examples illustrating the main results are also presented. Finally we discuss an analog Stieltjes multipoint-strip conditions case.

Set-valued theoretic classification of reproducing kernel Hilbert spaces included by $L^2[0,1]$

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In this talk, set-valued theoretic methods are applied to geometric characterization of the images of the closed unit ball under the compact positive operators defined on $L^2[0,1]$. Exactly speaking, the classification problem of subspaces with norms characterized by the images of the closed unit ball under the compact positive operators are discussed. These results are applied to classifying reproducing kernel Hilbert spaces whose kernels are jointly continuous on $[0,1]^2$.

On Emden-Fowler dynamical systems on time scales

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We study the existence and asymptotic behavior of nonoscillatory solutions of Emden-Fowler dynamical systems on time scales. In order to show the existence, we use Schauder, Knaster and Tychonoff fixed point theorems. Some examples are illustrated as well.

Bernstein's Lethargy theorem in Fréchet spaces

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In this talk, we consider Bernstein's Lethargy Theorem (BLT) in the context of Fréchet spaces. Let X be an infinite-dimensional Fréchet space and let $\mathcal{V} = \{V_n\}$ be a nested sequence of subspaces of X such that $\overline{V_n} \subseteq V_{n+1}$ for any $n \in \mathbb{N}$ and $X = \overline{\bigcup_{n=1}^{\infty} V_n}$. Let e_n be a decreasing sequence of positive numbers tending to 0. Under an additional natural condition on $\sup\{\text{dist}(x, V_n)\}$, we prove that, there exists $x \in X$ and $n_o \in \mathbb{N}$ such that

$$\frac{e_n}{3} \leq \text{dist}(x, V_n) \leq 3e_n$$

for any $n \geq n_o$. By using the above theorem, we prove both Shapiro's [4] and Tyuremskikh's [5] theorems for Fréchet spaces. Considering rapidly decreasing sequences, other versions of the BLT theorem in Fréchet spaces will be discussed. We also give a theorem improving Konyagin's [3] result for Banach spaces.

This talk is based on the joint works with Jose M. Almira [1] and Grzegorz Lewicki [2].

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Fixed points of generalized α-admissible contractions on b-metric spaces and applications

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In this talk a general class of α-admissible contractions defined via b-comparison functions on b-metric spaces is introduced. The existence and uniqueness of fixed point for this class of contractions is discussed and some consequences are presented. The results are formulated in the framework of partially ordered b-metric spaces. As an application, a boundary value problem for a first order ordinary differential equation is presented and conditions for the existence and uniqueness of solution of this problem are stated.

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Monotone generalized contractions in ordered metric spaces

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In this article, we present some coincidence point results for g-monotone mappings under Boyd-Wong type contractions in ordered metric spaces. Presented results generalize and improve the well known results due to Ran and Reurings (Proc. Amer. Math. Soc. 132 (5) (2004) 1435-1443) and Nieto and Lopez (Acta Math. Sin. 23 (12) (2007) 2205-2212).

On the Implicit Midpoint Rule for nonexpansive mappings

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The implicit midpoint rule (IMR) for nonexpansive mappings in a Hilbert space H was introduced by Alghamdi et al.(Fixed Point Theory and Applications 2014, 2014:96). Our purpose now is to extend the IMR to the setting of Banach spaces. The weak convergence of the algorithm is shown in a uniformly convex Banach space either with Opial's property or having a Fréchet differentiable.

Convergence of one step iteration scheme for a family of multi-valued nonexpansive mappings in $CAT(0)$ spaces with an application

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In this paper, we introduce one step iteration scheme for a finite family of multi-valued nonexpansive mappings in $CAT(0)$ spaces and utilize the same to prove Δ-convergence as well as strong convergence theorems with and without end point conditions. We also apply our main result to image recovery problem. Our results generalize and extend the results of Abbas et al., Appl. Math. Lett. 24(2011), 97-102 , Eslamian and Abkar, Math. Comput. Modelling 54 (2011), 105-111, and Bunyawat and Suantai, Int. J. Comput. Math. 89 (2012), 2274-2279.

Keywords: $CAT(0)$ space, Fixed point, Δ-convergence, Opial's property and Image recovery problem.

Fixed point and best proximity point results for mappings satisfying a new contractive condition

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Let (X, d) be a metric space, let A and B be nonempty subsets of X and let $q : B \to A$ be a nonexpansive map. We say that a map $T : A \to B$ is q-contraction if for some $k \in (0, 1)$, we have

$$d(Tx, qTy) \leq kd(x, qy) + (1 - k)d(A, B), \quad \forall \ x, y \in A.$$

T is said to be q-nonexpansive if $d(Tx, qTy) \leq d(x, qy)$ for all $x, y \in A$. We first consider the best proximity point problem for q-contractions which includes, as particular cases, the problems of best proximity points for cyclic and noncyclic contractions. Then, we present some existence results for best proximity points of q-contractions. In particular, as a generalization of Banach's contraction principle, we show that every q-contraction map $T : X \to X$ has a fixed point. Let K be a closed,bounded (weakly compact) and convex subset of a Banach space $(X, \|.\|)$ and let $q : K \to K$ be a nonexpansive map. We say that the Banach space X has the q-FPP (q-WFPP) if every q-nonexpansive map $T : K \to K$ has a fixed point. We also study the problem of characterizing the Banach spaces with the q-FPP (q-WFPP) and give some partial answers to this problem. Our results generalize and improve some well-know results in the literature [1-4].

Keywords: Fixed point; Best proximity point; q-contraction; q-nonexpansive map.

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Split type problems in nonlinear analysis

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In this talk, we present some split type problems from nonlinear analysis which are studied in the recent past. We give some iterative methods for finding the solutions of these problems. We also deal with the common solution Methods for finding a fixed point of a nonexpansive mapping and a solution of a split hierarchical variational inequality problem. We discuss the weak convergence of the sequences generated by the proposed methods to a common solution of a fixed point Problem and a split hierarchical variational inequality problem. We shall present an example to illustrate the proposed Algorithm and result.

A note on bicompletions of quasi cone metric spaces

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It is well known that every quasi metric space admits a bicompletions see, [2] and [3], such a bicompletion is unique up to isometry. The purpose of the paper is to show that every quasi cone metric space admits a bicompletion which is unique up to isometry. A similar completion theory was done in the context of cone metric spaces by Abdeljawad [1]. The restriction of our bicompletion results to cone metric spaces coincide with the completion theory as in [1]. As applications to the bicompletion theory we present extension of contraction maps in this context.

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New generalized fixed point theorems on S-metric spaces

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In this study, we present new fixed point theorems on complete S-metric spaces. Our results generalize some fixed point results in the literature.

Best proximity points of local contractions endowed with binary relation

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Samet et al. [B. Samet, C. Vetro and P. Vetro, Fixed point theorems for $\alpha - \psi$-contractive type mappings, Nonlinear Anal., 75 (2012) 2154–2165.] introduced $(\alpha - \psi)$ - contractive type mapping and obtained fixed point of such mappings in complete metric spaces. It followed by several modifications and improvements by several authors. Fixed points results of mappings satisfying certain contractive conditions on the entire domain has been at the center of rigorous research activity, and it has a wide range of applications in different areas such as nonlinear and adaptive control systems, parameterize estimation problems, fractal image decoding, computing magneto static fields in a nonlinear medium, and convergence of recurrent networks. From the application point of view the situation is not yet completely satisfactory because it frequently happens that a mapping T is a contraction not on the entire space X. Arshad et al. [M. Arshad , A. Shoaib, I. Beg, Fixed point of a pair of contractive dominated mappings on a closed ball in an ordered complete dislocated metric space, Fixed Point Theory Appl., (2013) 2013:115] established fixed point results of a pair of contractive dominated mappings on a closed ball in an ordered complete dislocated metric space. Hussain et al. [N. Hussain, M. Arshad, A. Shoaib and Fahimuddin, Common fixed point results for $(\alpha - \psi)$-contractions on a metric space endowed with graph, J. Inequal. Appl., (2014) 2014:136] introduced the concept of an α-admissible mappings with respect to η and modified $(\alpha - \psi)$-contractive condition for a pair of mappings and established common fixed point results of four mappings on a closed ball in complete dislocated metric space. Jleli et al. [M. Jleli , B. Samet, Best proximity points for $\alpha - \psi$-proximal contractive type mappings and applications, Bull. Sci. Math., 137 (2013) 977-955] obtained best proximity point results of $(\alpha - \psi)$- proximal contractive type mappings in complete metric space. The aim of this talk to investigate best proximity point results of $(\alpha - \eta, \psi)$- proximal mappings satisfying locally contractive conditions on a closed ball in complete metric spaces. An example is constructed to validate the results proved herein. In the last section, we obtain results endowed with binary relation to show the existence of best proximity point. The results of current study extended and generalized various comparable results in the existing literature

On Ekeland's variational principle in M-metric spaces

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In this talk, we generalize and improve very recent results in Ekeland's variational principle from the class of partial metric spaces in the class of M-metric spaces. And in the sequel we obtain certain fixed point theorems such as Caristi type.

Solution of a non-linear integral equation using a new three-step iteration

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In this presentation, we introduce a new three step iteration process and show that this iteration process strongly converges to the unique fixed point of weak-contraction mappings. Furthermore, we obtain this iteration process is equivalent to Mann iteration method and converges faster than Picard-S iterative scheme. Also, we create a table and graphics to support this result. Moreover, we show that this iteration method can be use to solve a nonlinear integral equation. Finally, a data dependence result for the solution of this integral equation is proven.

A second order differential inclusion governed by the subdifferential

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In the present paper we prove, in the finite dimensional setting, the existence of solutions for the second order differential inclusion of the form

$$-x''(t)E@(g(x'(t))) + f(t, x(t), x'(t)); a.e.tE[0; T]; x(0) = x0; x'(0) = u0$$

where f is a continuous bounded mapping, $@(g(.))$ is the subdifferential of the proper convex lower semicontinuous real valued function $g(.)$.

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A common fixed point theorem using Krasnoselskii-Mann method

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Let H be a Hilbert space and C be a closed , convex and nonempty subset of H. Let $T : C \to H$ be a nonself and non-expansive mapping. Recently V. Colao and G. Marino with particular choice of the sequence $\{\alpha_n\}$ in Krasonselskii-Mann algorithm, $x_(n+1) = \alpha_n x_n + (1-\alpha_n)Tx_n$, proved both weak and strong converging results. This is the question which we want to answer: Under which assumption their algorithm can be adapted to produce a converging sequence to a common fixed point for two mappings?

Dunford-Petties sets and V*-sets

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In this talk we discuss new results concerning compact operators, completely continuous, and unconditionally converging operators. The main results give characterizations of Banach spaces X which if T is an operator from X to Y for any Banach space Y such that $T*$ is unconditionally converging, then T is compact in terms of DP sets, and $V*$-sets. We also discuss some applications of these results to classical Banach spaces.

Common fixed point on one or two generalized metric spaces

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The purpose of this work is to prove some common fixed point theorems for two operators on a set endowed with one or two vector-valued metrics. Problems of this type arise from mathematical modeling of many processes from a variety of disciplines, including physics, biology, chemistry, engineering and other sciences.

Dynamics of third order system of rational difference equation

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In this work, we study the global behavior of positive solution for the system of two nonlinear difference equations

$$t_{n+1} = \frac{\alpha t_{n-2}}{\beta + \gamma z_n^k z_{n-1}^k z_{n-2}^k}, \; z_{n+1} = \frac{\alpha' z_{n-2}}{\beta' + \gamma' t_n^k t_{n-1}^k t_{n-2}^k}, \; n = 0, 1, ...,$$

where the initial conditions t_0, t_{-1}, t_{-2}; z_0, z_{-1}, $z_{-2} \in [0, +\infty)$ and the parameters α, $\alpha^{'}$, β, $\beta^{'}$, γ, $\gamma^{'}$ are positive real numbers such that $\alpha \neq \beta$ and $\alpha^{'} \neq \beta^{'}$ and $k \geq 1$ is a fixed integer.

Keywords: Difference equation, System of rational difference equations, Stability, Global behavior, Oscillatory

MSC: 39A10.

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Constructive fixed point theorems

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Fixed Point Theory and its Applications is an extremely dynamic field of research, with an impressive production of journal articles, conference papers, monographs etc., see for example the Introduction to [1], for a comprehensive overview of the records prior to the year 2008. The main aim of this presentation is to emphasize the distribution of theoretical contributions versus applicative contributions, by means of some recent topics in *Fixed Point Theory and its Applications*. The conclusion is that the overwhelming dominance of *Fixed Point Theory and its Applications* has to be balanced by relevant applicative research work rather than theoretical research work. In this context, the concept of constructive fixed point theorem is then highlighted and some challenging directions of research are indicated.

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The fixed point property for some generalized nonexpansive mappings

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In 2008, T Suzuki defined one of the most relevant extension of the notation of nonexpansivity. This definition was extended by J. García Falset, E. Lloréns Fuster and T. Suzuki in 2011. They defined the, so called, C_λ-mappings. In the last years, some papers have appeared trying to extend the most important results about existence of fixed points for nonexpansive mappings to this wider class. In this talk I present my results in this topic.

Krasnosel'skii fixed point theorems for convex-power condensing multivalued mappings and application to integral inclusion

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In this work, we introduce a class of convex-power condensing mappings with respect to a measure of weak noncompactness in Banach spaces. We present new Krasnosel'skii fixed point theorems for multivalued mappings which have sequentially closed graph. We prove also a new version of Leary-Schauder type results. We apply these results to investigate the existence of weak solution to a Volterrra integral inclusion of Krasnosel'skii type in a non reflexive space.

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Some common fixed points results for commuting k-set contraction mappings and applications

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The purpose of this talk is to present new common fixed point theorems for commuting mappings. In further, deduce new classes of k-set contraction mappings and guarantee the existence of their fixed points. As application, establish an integral version of these results. Finally, introduce and study the solvability of a new type of integral equation. This work presents results that can be considered as generalizations of many works in literature.

The Wolff-Denjoy property

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In our talk we present the latest results connected with the classical Wolff-Denjoy theorem.

The tau fixed point property for left reversible semigroups

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We use the generalized Gossez-Lami Dozo property and the Opial condition to study the fixed point property for left reversible semigroups in separable Banach spaces. As a consequence, some previous results will be deduced and new examples of Banach spaces satisfying the fixed point property for left reversible semigroups are shown. We will also extend some previous theorems when we consider the semigroup formed by a unique nonexpansive mapping and its iterates.

Qualitative results for a nonconvex hyperbolic inclusions of third order via fixed points

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We consider a Darboux problem associated to the following third order hyperbolic differential inclusion

$$u_{xyz}(x,y,z) \in F(x,y,z,u(x,y,z)), \quad (x,y,z) \in \Pi := [0,T_1] \times [0,T_2] \times [0,T_3],$$

where $F : \Pi \times \mathbf{R}^n \to \mathcal{P}(\mathbf{R}^n)$ is a set-valued map and we study the properties of the map that associates to given initial conditions the set of solutions of the problem considered. We prove that this solution map depends Lipschitz-continuously on the initial conditions by applying the set-valued contraction principle in the space of selections of the multifunction instead of the space of solutions as usual. This approach allows us to obtain a Filippov type existence result for solutions of problem studied. We prove also that the solution set is a retract of a convex set of a Banach space. This result provides the existence of continuous selections of the solution set multifunction. Moreover, we find that any two continuous selections from the solution map are homotopic. All the results are obtained using fixed point techniques.

Borsuk's antipodal fixed points theorem for approachable condensing set-valued maps

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We give a generalized version of the well known Borsuk's antipodal fixed point theorem for a large class of condensing or compact set-valued maps defined on non-necessarily closed subsets of Hausdorff locally convex topological vector spaces. Our result include convex as well as non-convex set-valued maps.

On the convergence of the generalized Schwarz domain decomposition methods in the continuous and discrete cases

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With the development of parallel computers, domain decomposition methods have been increasingly used as important tools for solving boundary value problems. There exist, in practice, two ideas of decomposition of the domains: with and without overlapping of subdomains. This work is concerned with the analysis of the generalized domain decomposition method with overlapping, by using Robin boundary conditions on the interfaces in the continuous and discrete cases (discretisation par conforming finite elements of order k greater or eaqual to 1). The nonoverlapping case was studied in [1-3]. We use the energy method of Lions [2] for the study of the convergence in the countinuous case and for estimating the convergence rate in the discrete case. We use a modified idea of Deng [1] to facilitate the application of this method to discretisation problems to avoid the computation of normal derivatives in each iteration.

Keywords: Robin boundary conditions, generalized domain decomposition method, overlapping decomposition, energy method.

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Matrix approaches to approximate solutions of variational inequalities in Hilbert spaces

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Matrix approaches to approximating solutions of variational inequalities in Hilbert spaces are presented. These methods combine new or well known iterative methods (such as the original Mann's method) with regularized processes involved regular matrices in the sense of Toeplitz.

Krasnoselskii-Mann algorithm for non-self mappings

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The convergence of a Krasnoselskii-Mann algorithm for inward mappings will be investigated. We will prove that the converge can be also strong, depending on the properties of the involved map and the geometry of its domain.

Fixed point theorems of mappings of Perov type

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We consider various contraction conditions on a complete cone metric space, but instead of a contraction constant we have a bounded linear operator. Many results on both normal and non-normal cone metric spaces are generalized including Perov's theorem. Our results could not be obtained by Du's scalarization method.

Stationary solutions of nonlinear p-Laplace equations,

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We deal with one dimensional p-Laplace equation of the form

$$u_t = (|u_x|^{p-2}u_x)_x + f(x,u),\ x \in (0,l),\ t > 0,$$

under the Dirichlet boundary conditions, where $p > 2$ and $f : [0,l] \times \mathbb{R} \to \mathbb{R}$ is a continuous function with $f(x,0) = 0$, $x \in [0,l]$. We will prove that if there is at least one eigenvalue of the p-Laplace operator between the numbers $\lim_{u\to 0} f(x,u)$ and $\lim_{|u|\to+\infty} f(x,u)$, then there exists a nontrivial stationary solution. The results are obtained by use of Conley type homotopy index (see [1]) and homotopy along p techniques (see [2], [3]).

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A fixed point theorem applied for proving the unique weak solution for a contact problem with Tresca friction law

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In this work we study a mathematical model which describes the bilateral, frictionless adhesive contact between two electro-elastic bodies. We establish a variational formulation for the problem and prove the existence and uniqueness result of the solution. The proofs are based on time-dependent variational equalities, a classical existence and uniqueness result on parabolic equations, differential equations and fixed-point arguments.

MSC: 74M15, 74F99, 74G25,74R99.

Keywords and phrases. Fixed Point Theorem; Contact Problem; Tresca Friction Law; Electro-elastic materials; weak solution.

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On weak contractive cyclic maps in generalized metric spaces and some related results on best proximity points and fixed points

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This talk discusses the properties of convergence of sequences to limit cycles defined by best proximity points of adjacent subsets for two kinds of weak contractive cyclic maps defined by composite maps built with decreasing functions with either the so-called r-weaker Meir-Keeler or with the so-called (r, r_0)-stronger Meir-Keeler functions in generalized metric spaces. Particular results on fixed points are obtained for the case when the sets of the cyclic disposal have a nonempty intersection. Some illustrative examples are discussed. The main results are concerned with $(\phi - \phi)$-weak p-cyclic contraction mappings and on generalized $(\phi - \psi)$-weak p-cyclic contraction mappings and they are related to the boundedness and convergence properties of generalized distances of sequences of points, and, also, on the convergence properties of sequences generated through the cyclic maps to best proximity points and/or to fixed points.

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Condensing operators and application to stochastic differential equations.

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In this talk, we study the existence and uniqueness of the solution of stochastic differential equation by means of the properties of the associated condensing nonexpansive random operator. By taking account to the results of Diaz and Metcalf, we prove the convergence of Kirk's Process to this solution.

On the regularization of a class of nonlinear ill-posed problems

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In this paper, we consider an abstract nonlinear ill-posed problem associated with an unbounded linear operator in a Hilbert space. This problem is known to be ill-posed. We regularize this problem using a new modified quasi-boundary value method to obtain a family of approximate nonlocal problems depending on a small parameter. Using a fixed point theorem, we show that the approximate problems are well posed (stable) and we establish estimates of the solutions of the obtained approximate problems and show that their solutions are approximate solutions to the exact solution of the original problem. Finally, we establish some other convergence results.

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On Mann-Picard Newton-like iteration process

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In this presentation we found new iterative schemes of Newton-like inspired by modified Newton iterative algorithm and prove that these iterations are faster than the existing ones in literature. In further, investigate their behavior and finally we illustrate the results by numerical examples.

Asymptotic contractiveness and fixed points for generalized nonexpansive mappings on unbounded sets

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Let X be a Hilbert space. W.O. Ray proved in 1980 that for every closed convex unbounded subset C of X, there exists a nonexpansive mapping $T : C \to C$ which is fixed point free. Recently we have proved that the same is true whenever X is the space c_0 of null sequences with the maximum norm. It is unknown if any other Banach space shares this property, and in fact, it is also unknown it there exists an unbounded convex set enjoying the fixed point property for nonexpansive mappings. In this talk we will discuss about some additional asymptotic contractiveness conditions which guarantee the existence of fixed point for generalized nonexpansive mappings defined on unbounded domains.

Recent developments about multivalued weakly Picard operators

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This research contains some recent developments about multivalued weakly Picard operators on complete metric spaces. In addition, taking into account both multivalued theta-contraction and almost contraction on complete metric spaces, we present a broad class of multivalued weakly Picard operators. Finally, we give some nontrivial examples showing that the investigation of this paper is significant.

Fixed points of α-admissible Meir-Keeler contraction mappings on quasi-metric spaces

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In this talk, we introduce α-admissible Meir-Keller and generalized α-admissible Meir-Keller contractions on quasi-metric spaces and discuss the existence of fixed points of such contractions. We apply our results to G-metric spaces and express some fixed point theorems in G-metric spaces as consequences of the results in quasi-metric spaces.

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Some fixed point theorems for set-valued mappings in Banach spaces

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In 1969 Belluce and Kirk [1] showed that if K is a nonempty convex weakly compact subset of a Banach space X and f is a continuous map on K with the approximate fixed point property and $I-f$ is convex, then f has a fixed point. In order to extension and improvement the Belluce and Kirk result, Ko [4] introduced the notion of semiconvexity for set-valued mappings and he proved that if K is a weakly compact convex subset of Banach space X, $T : K \to 2^K$ is upper semicontinuous with the approximate fixed point property and $I-T$ is semiconvex, then T has a fixed point. Later, Yanagi [6] extends this result for weakly inward nonexpansive mappings. Chang and Yen [2] generalized the notion of semiconvexity and generalized the results of Belluce and Kirk [1], Ko [4], Yanagi [6]. Carcia-Falset, Llorens-Fuster and Sims [3] introduced the concept of α-almost convex mappings and they showed that if C is a closed convex subset of a Banach space X, $T : C \to X$ is norm continuous and α-almost convex, then $I-T$ is demiclosed. Then they applied this result to derive some fixed point results. Llorens-Fuster [5] generalized the results in [3] for set-valued mappings. In this talk we introduce the concept of nearly quasi-convex and generalized regular-global-inf mappings. We obtain some fixed point theorems for such mappings which improve the fixed point theorems in [1-6].

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Fixed point iterations in hyperbolic metric spaces

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The inequality of Xu [4, Theorem 2], an analogue of parallelogram identity in Hilbert spaces and the well-known Lemma of Schu [3, Lemma 1.3] are playing a pivotal role for the approximation of fixed points of certain mappings in uniformly convex Banach spaces. We need counter part of these fundamental results for iterative methods in a metric space (nonlinear domain). Khamsi and Khan [1] have established an analogue of the parallelogram identity on a nonlinear domain. The concept of Banach limit is also helpful in the study of iterative construction in linear and nonlinear domains (cf. [2]). In this talk, some basic properties of Banach limits will be presented. As applications, we will use Banach limits (parallelogram identity of Khamsi and Khan) for the iterative construction of fixed points of nonexpansive mappings in hyperbolic metric spaces.

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Common best proximity pairs for a commuting family of noncyclic relatively u-continuous mappings

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We present a best proximity pair theorem for generalized noncyclic contractions defined on a nonempty, weakly compact and non-convex pairs in strictly convex Banach spaces. We also give a common best proximity pair result for a commuting family on noncyclic relatively u-continuous mappings which are affine.

Iterative approximation to a coincidence point of two mappings

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Two methods for approximating the coincidence point of two mappings are studied, rates of convergence for both methods are given. In particular, we apply such results to study the convergence and their rate of convergence of these methods to the solution of a nonlinear integral equation and a nonlinear differential equation.

Fixed points on hybrid contractive conditions in partially ordered metric space

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The purpose of this paper is to establish coincidence point and fixed point results under generalized hybrid type of contractive conditions by using δ-distance in metric spaces endowed with a partial order. In some of the results the altering distance function has been used to obtain common fixed point for a family of multivalued mappings with single valued maps. These results are illustrated by suitable examples and these are the extension and generalization of the recent results of Gregorio et.al[11] and Choudhury et.al[12].

Common fixed points of almost generalized $(\alpha - \beta)$-$(\psi - \phi)$-weakly contractive mapping in modular spaces

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In this paper, we introduce cyclic $(\alpha - \beta)$-admissible pair and establish common fixed points of almost generalized $(\alpha - \beta)$-$(\psi - \phi)$-weakly contractive mapping in modular spaces. As an application, some fixed and common fixed point results for such mappings on modular spaces with a graph have been obtained.

Trend constants for Lipschitz mappings

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Regularity of mappings on convex sets in Banach spaces is commonly estimated by the size of its Lipschitz constant. There is a relatively new idea to consider additional coefficients called the initial and terminal trend constants. It leads to a more subtle classification of mappings. We present the basic facts and applications of this approach for various aspects of metric fixed point theory.

Purely non-free finite group actions on compact surfaces

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A group G of self-homeomorphisms of a topological space X is said to act *purely non-freely* if each its element has a fixed point. Here X is assumed to be closed compact surface, say of genus $g \geq 2$ and G to be finite. A first time we have heard about this property for finite actions on surfaces was two years ago, in a talk of J. Gilamn (Rutgers) in context of her study of adapted basis for the derived action on the first integral homology group and to underline surface context we shall refer to such action as to *Gilman* one. When we started to look closer at this concept, we quickly realized that such an action exist for an arbitrary finite group G, but the genus of constructed, ad hoc, one lies somewhere between $N^2/2 - N + 1$ and $N^2/4 - N + 1$, where $N = |G|$. This genus is rather big if one compares it to the genus of a most celebrated Hurwitz action, which is $N/84 + 1$ (although we have to admit frankly that the latter is far from being Gilman and so it is not a precisely right example). However, the situation is not as bad as it looks like since for an elementary abelian 2-group of order $N = 2^n$ we have shown that the minimal genus of a surface admitting Gilman action is equal to $(2^n - 5)2^{n-2} + 1$, which is precisely in the range given above. On the other hand, surprisingly we have discovered also some Gilman quasi-platonic actions, including an action of the semi-direct product $F^* \ltimes F^+$ of the multiplicative and additive groups of an arbitrary finite field F, on a surface whose genus g is bounded above by $N/12 + 1$, and hence is very closed to the mentioned Hurwitz genus. All these examples, suggest that the classical problems of the minimum genus and the maximum order can become very interesting here. The work is in progress and we plan to get until the talk, results concerning nilpotent and supersoluble groups, believing that these classes form a good equilibrium between the difficult general case of all groups, and rather easy case of abelian groups. We plan to consider similar problems for bordered or non-orientable compact surfaces and the most challenging, by now, problem of characterization of quasi-platonic Gilman actions. The results are of purely topological character but their proofs require combinatorially-conformal technics allowed by Nielsen-Kerekjarto geometrization theorems.

Some convergence and data dependence results for the class of quasi-contractive type operators in convex metric spaces setting

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We introduce a new iterative method in a convex metric space to approximate fixed points of quasi-contractive operators due to Berinde. The results presented here extend and improve some recent results announced in the existing literature.

The convergence analysis of a new iterative process for hybrid pair mappings in Banach spaces

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In this presentation, we prove some convergence theorems of a new iteration including a hybrid pair of finite family of some class of single valued mappings and a finite family of some class of multivalued mappings in Banach spaces. These results are generalization of some results.

Applications of Schauder's fixed point theorem to the existence of solution of fractional differential equations

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An application of fixed-point theorem has been used to obtained local existence and uniqueness theorem of a non-linear differential equations of non-integer order.

MSC: 26A33

Keywords: Fractional Calculus

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Positive solutions for some boundary value problems via a new fixed point theorem

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In this paper, we establish some new fixed point theorems of mixed monotone operator with a perturbation. Moreover, we prove the existence and the uniqueness of positive solutions of a second order Neumann boundary value problem, a second order Sturm Liouville boundary value problem and a nonlinear elliptic boundary value problem for the Lane-Emden-Fowler equation.

Digital version of the fixed point theory

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In this talk, we studies the fixed point theory from the viewpoint of digital topology. Motivated by the Brouwer fixed point theorem, the Lefschetz fixed point theorem and so forth [2, 5] , we can consider their digital versions. More precisely, in digital topology, we say that a digital image (X, k) has the fixed point property if every k-continuous map $f : (X, k) \to (X, k)$ has a fixed point $x \in X$, *i.e.* $f(x) = x$. Unlike the formal research into the fixed point property, in digital topology [1, 3, 4, 6] we have some intrinsic features. This approach can contribute to a certain areas in computer science.

Keywords and phrases: digital topology, Brouwer fixed point theorem, Lefschetz fixed point theorem, digital homotopy.

MSC:55Q70,52CXX,55P15,68R10,68U05

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The split common fixed point problem in Banach spaces

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In this talk, we consider the split common fixed point problem in Banach spaces. Using the hybrid method in mathematical programming, we prove a strong convergence theorem for finding a solution of the split common fixed point problem in Banach spaces. The result of this paper seems to be the first one to study it outside Hilbert spaces. Using this result, we get well-known and new results which are connected with the split feasibility problem and the split common null point problem in Banach spaces.

Some common fixed point results for two classes of contractive type mappings in complete partial metric spaces

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The aim of this paper is to present some common fixed point results for two classes of contractive type mappings (generalized T-Hardy-Rogers and generalized T-quasi contraction mappings) in the setup of complete partial metric spaces. Our results are extensions of some earlier fixed point theorems in cone metric spaces. We give two examples to illustrate our obtained results.

Approximation of a zero point of maximal monotone operators with errors in a Hilbert space

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In this talk, we study the shrinking projection method with error introduced by Kimura (J. Nonlinear Convex Anal. 15:429-436, 2014). We obtain an iterative approximation of a zero point of a maximal monotone operator generated by the shrinking projection method with errors in a Hilbert space. Using our result, we discuss some applications.

On approximation of fixed points of multi-valued nonexpansive mappings in Hilbert spaces

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A sufficient condition that guarantees a demiclosedness property for a multivalued nonexpansive mapping T in a real Hilbert space is introduced. It is also proved that under this condition the Mann sequence converges weakly to a fixed point of T without the condition that the fixed point set of T is strict. The results obtained extend, complement and improve the results on multivalued and single valued nonexpansive mappings in the contemporary literature.

Renorming theory and fixed point theory

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The nonexpansiveness of a mapping depends on the underlying norm, that is, the set of nonexpansive mappings may change if two equivalent norms are considered over the same Banach space. Therefore, a Banach space X could have different behaviour for the fixed point property (FPP) according to the equivalent norm which is fixed beforehand. In this talk we will investigate some results connecting renorming theory with fixed point property for some classes of Banach spaces and we will state some problems which are still open.

A weakly contractive map on the space $\mathcal{C}([-1,1])$

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In this talk we firstly make some comments on the definition of weakly contractive maps. Then, we give an example of a weakly contractive map on the space $\mathcal{C}([-1,1])$ which can be used to obtain an approximation result.

Determination of a leading coefficient to the time derivative of heat equation with nonlocal boundary conditions

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In this paper the problem of determining the time-dependent leading coefficient to the time derivative of heat equation in the case of nonlocal boundary and integral overdetermination conditions is considered. The conditions for the existence and uniqueness of a classical solution of the problem under considerations are established with Banach Fixed Point Theorem. Some results on the numerical solution with an example are presented.

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Best proximity point results for F-contraction satisfying rational expressions in complex valued metric spaces

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In this paper, we prove the existence of a unique best proximity point for F-contraction including rational expressions in the setting of complex valued metric space. The presented results extend, generalize and improve some known results from best proximity point theory and fixed point theory.

Keywords: Best proximity point, Fixed point, F-contraction, Complex valued metric.

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Difficulties in studying "Metric fixed point theory"

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The nature of mathematics, in particular, fixed point theory is to get more and more general results in the literature. As it is expected, it is not easy. Although some recent published reports claimed to generalize certain results in the literature, in fact, this is not correct. The aim of this talk to illustrate that fact with examples.

Some common fixed point theorems for (F, f)-contraction mappings in $0 - G_p$-complete G_p-metric spaces

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In this article, we introduced the concept of (F, f)-contraction and the concepts of generalized (F, f)-contractions on G_p-metric space. Furthermore, we obtained some common fixed point results for two Banach pairs of mappings which satisfy (F, f)-contraction and the generalized (F, f)-contractions. The presented theorems generalize known results in the literature. We also provide examples to illustrate the usability of our results presented herein.

Best proximity points in the Hilbert ball

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Many important problems of mathematics can be translated in a fixed point equation for selfmappings. If this equation does not have a solution, then it is of interest to find an approximate solution; in other words, we search for an element in the domain of the mapping whose image is as close to it as possible in some sense. Best approximation theory is concerned with the existence of an approximate solution. Fan Best Approximation Theorem If A is a nonempty compact convex subset of a normed space X and $T : A \to X$ is continuous, then there exists $x \in A$ such that

$$|x - Tx| = d(Tx, A) = \inf\{|Tx - a| : a \in A\}.$$

As application of this theorem, several fixed point results under many boundary conditions have been derived. The best proximity point theory evolves as a generalization of the concept of best approximation and it analyzes the existence of an approximate solution that is optimal. Since most fixed point results can be derived as a corollary of the corresponding best proximity point result, therefore best proximity point theory can be viewed as a generalization of fixed point theory. Raj and Eldred Best Proximity Point Theorem Let A, B be nonempty, closed, and convex subsets of a strictly convex Banach space X and $T : A \to B$ be a contraction mapping such that $T(A_0) \subseteq B_0$, where $A_0 = \{x \in A : |x - y| = dist(A, B) \text{ for some } y \in B\}$ and $B_0 = \{y \in B : |x - y| = dist(A, B) \text{ for some } x \in A\}$. Then there exists a unique $x \in A$ such that $|x - Tx| = dist(A, B) = \inf\{d(a, b) : a \in A, b \in B\}$. Further, for each fixed x_0 in A_0, there is a sequence $\{x_n\}$ such that, for each $n \in \mathbb{N}$, $x_(n + 1) - Tx_n = dist(A, B)$ and $\{x_n\}$ converges to the best proximity point x . The main aim of this talk is to present best proximity point and coupled best proximity point results for nonself contractions and nonself nonexpansive mappings in open unit Hilbert ball equipped with the hyperbolic metric.

Results on fixed and coincidence points in a multiplicative metric space

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In this paper, we prove a unique common fixed point theorem for two pairs of weakly compatible mappings on complete multiplicative metric spaces without any continuity requirement which generalizes corresponding results of Xiaoju He, Meimei Song and Danping Chen (Fixed point Theory and Application 1-9(2014) and Ozavsar, M Cevikel, AC, (arXiv:12055131v1[math.Gn](2012)proved multiplicative metric spaces. Some related results are also derived besides furnishing an illustrative example.

Some applications of Caristi's fixed point theorem in metric spaces

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In this work first we show that many of known Banach contractions generalization can be deduced and generalized by Caristi fixed point theorem and its consequences Also, some partial answers to some known open problems are given via Caristi's corollaries. In the sequel, we investigate the existence of fixed points for simultaneous projections and Landweber operators to find the optimal solutions of some proximity functions via Caristi fixed-point theorem.

Fixed point theorems for generalized F-contractions and generalized F-Suzuki contractions in metric spaces

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In this talk, we established some new fixed point theorems for generalized F-contractions and generalized F-Suzuki contractions in complete metric spaces. The main results of this paper are an extension of the Banach contraction principle, Suzuki contraction theorem, Wardowski fixed point theorem and Piri-Kuman fixed point theorem.

Approximation of a common fixed point for mappings defined on a geodesic space

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In this talk, we consider the approximation problem for a fixed point of a mapping defined on a complete geodesic space. Various types of iterative method for this problem has been proposed by a large number of researchers, which includes the Mann type method, the Halpern type method, several different kinds of projection methods, and others. We focus on the iterative scheme for a finite family of nonexpansive mappings generated by the shrinking projection method. In the practical calculation, it is a task of difficulty to calculate the exact value of metric projections which is required to obtain the iterative sequence by this method. To overcome this difficulty, we consider a calculation error for obtaining the value of metric projections. The iterative scheme we propose has a nice property in the sense that we are able to estimate an upper bound of the asymptotic distance between the point in the sequence and its image by the mappings. To prove this result, we do not need to suppose any summability condition for the error terms.

Coincidence point theorems for some contractive multi-valued mappings in a metric space endowed with graph

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In this paper, we introduce the concepts of weak g-graph preserving for multi-valued mappings and weak G-contractions in a metric space endowed with a directed graph. We establish the coincidence point theorems for this type of mappings in a complete metric space endowed with a directed graph. Examples illustrating our main results are also presented. Our results extend and generalized various known results in the literature.

Banach's contraction principle for mappings on cone metric spaces with a nonlinear contractive condition

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In 1964 Perov [2] established a generalization of Banach's fixed point theorem. He considered the so-called generalized metric space i.e., a pair (X, d), where d is a function from $X \times X$ to $\mathbb{R}^n$, d satisfies three well-known axioms of metric, and the space $\mathbb{R}^n$ is equipped with the following partial order: $(a_1, ..., a_n) \leq (b_1, ..., b_n)$ iff $a_i \leq b_i$ for $i \in \{1, ..., n\}$. A function $T : X \to X$ is called a contraction (in Perov's sense) if it satisfies the following condition

$$d(Tx, Ty) \leq A(d(x, y)), \text{ for all } x, y \in X,$$

where A is an $n \times n$ matrix with non-negative entries such that the spectral radius of A is less than one. If the space (X, d) is complete in some sense, and the function T is a contraction, then Perov's theorem yields a unique fixed point of T. It turns out that this theorem is a special case of Banach's fixed point theorem for cone metric spaces. The notion of a cone metric space was introduced in [1]: it is a pair $(X,\ d)$, where X is a nonempty set and d is a function from $X \times X$ to some Banach space E satisfying three axioms of a metric with respect to the following partial order $\leq$ in E: for $a, b \in E$, $a \leq b$ iff $b - a \in K$, where K is a cone in E. In [3] and [4] we obtained a generalization of Perov's theorem, in which d is a cone metric, A is a linear bounded operator, which is positive and its spectral radius is less than one. We consider even a more general condition, in which A is a Lipschitz operator such that A is positive, $A\theta = \theta$, and $\lim_{n\to\infty} L(T^n)^{\frac{1}{n}} < 1$.

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Quantitative results on Fejér monotone sequences

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We provide in a unified way quantitative forms of strong convergence results for numerous iterative procedures which satisfy a general type of Fejér monotonicity where the convergence uses the compactness of the underlying set. These quantitative versions are in the form of explicit rates of so-called metastability in the sense of T. Tao. Our approach covers examples ranging from the proximal point algorithm for maximal monotone operators to various fixed point iterations (x_n) for firmly nonexpansive, asymptotically nonexpansive, strictly pseudo-contractive and other types of mappings. Many of the results hold in a general metric setting with some convexity structure added (so-called W-hyperbolic spaces). Sometimes uniform convexity is assumed still covering the important class of CAT(0)-spaces due to Gromov. Our approach is based on proof mining techniques from mathematical logic.

Approximate common fixed points and rates of asymptotic regularity for one-parameter nonexpansive semigroups

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In this recent work [2] we extract quantitative information on the approximate common fixed points of a nonexpansive semigroup $\{T(t) : t \geq 0\}$ on a subset C of a Banach space E, under the assumption that for each $x \in C$ the mapping $t \to T(t)x$ from $[0, \infty)$ into C is uniformly continuous on each compact interval $[0, K]$ for all $K \in \mathbb{N}$ and that moreover given a $b \in \mathbb{N}$ it has a common modulus of uniform continuity for all $x \in C$ such that $\|x\| \leq b$. This is achieved by logical analysis of the proof (proof mining) of a theorem by Suzuki in [3]. We then apply our result to extract rates of asymptotic regularity for the nonexpansive semigroup $\{T(t) : t \geq 0\}$ on a convex subset C of a Banach space E with respect to the Krasnoselskii iteration.

This work is another contribution of proof mining ([1]) to fixed point theory; proof mining is a research program in applied proof theory that involves the extraction of new quantitative constructive information by logical analysis of proofs that appear to be nonconstructive. The information is 'hidden'behind an implicit use of quantifiers in the proof, and its extraction is guaranteed by certain logical metatheorems if the statement proved is of a certain logical form.

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Existence of a mild solution to a second-order impulsive functional-differential equation with a nonlocal condition

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An abstract second-order semilinear functional-differential equation such that the linear part of the right-hand side is given by the infinitesimal generator of a strongly continuous cosine family of bounded linear operators, and provided with impulse and nonlocal conditions is studied. Under not too restrictive conditions the existence of a mild solution is proved using Schauder's fixed point theorem.

Quantitative results for the variational inequality problem

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We provide a quantitative treatment for the Variational Inequality Problem over the fixed point set of a nonexpansive mapping on Hilbert space. In particular, we give a rate of metastability (in the sense of Tao) both for a resolvent-type implicit scheme and for the Hybrid Steepest Descent Method. The results are extracted from a theorem due to I. Yamada [2] and were obtained using proof mining techniques from mathematical logic [1].

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On the split-type problems in Hilbert spaces

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We modify the iterative scheme studied by Moudafi for quasi-nonexpansive operators to obtain strong convergence to a solution of the split common fixed point problem. It is noted that Moudafi's original scheme can conclude only weak convergence. As a consequence, we obtain strong convergence theorems for split variational inequality problems for Lipschitz continuous and monotone operators, split common null point problems for maximal monotone operators, and Moudafi's split feasibility problem.

Bifurcation from infinity for an asymptotically linear Schrödinger equation

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The talk is based on [1]. We consider the asymptotically linear Schrödinger equation

$$-\Delta u + V(x)u = \lambda u + f(x,u), \quad x \in \mathbb{R}^n$$

as well as an abstract problem of the form

$$Lu = \lambda u + N(u),$$

where L is a linear (unbounded) operator in a Hilbert space, and show that if λ_0 is an isolated eigenvalue for the linearization at infinity (resp. $L - N'(\infty)$), then under some additional conditions there exists a sequence (u_n, λ_n) of solutions such that $\|u_n\| \to \infty$ and $\lambda_n \to \lambda_0$. Our results extend those by Stuart [2]. We use degree theory if the multiplicity of λ_0 is odd and Morse theory (or more specifically, Gromoll-Meyer theory) if it is not.

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A few remarks on the Kobayashi distance

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In our talk we describe the limit behavior of the Kobayashi distance k_{D_m}, where $\{D_m\}$ is either a monotonic sequence of bounded and convex domains in a complex Banach space $(X, \|\cdot\|)$ or a convergent in the Hausdorff metric sequence of bounded and convex domains in a complex Banach space $(X, \|\cdot\|)$. Next we apply the obtained results in constructions of the families of equibounded and convex domains which are locally equiuniformly linearly convex with respect to their Kobayashi distance.

The common limit in the range of g property (CLRg property) for the fixed point results

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In my talk, we review and survey some fixed point theorems which satisfy the property which is so called *"common limit in the range of g property (CLRg property)"* for self-mappings. Moreover, we establish some new existence of common fixed point theorems for generalized contractive mappings in fuzzy metric spaces by using this new property and give some examples to support our results.

Keywords: CLRg property, fuzzy metric space, weakly compatible, generalized contractive mappings, fixed points

Fixed points of set-valued mappings defined on probabilistic normed space

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In this talk, the concept of upper hemicontinuous for set-valued mapping on a probabilistic normed space is introduced and Kakutani's fixed point theorem on this space is proved.

Existence of continuous solutions of nonlinear Hammerstein integral equations proved by fixed point theorem on posets

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In this paper, we construct some chain-complete partially ordered subsets of the space of continuous functions over some topological measure spaces. Then by applying Abian-Brown fixed point theorem on chain- complete posets, we prove the existence of continuous solutions to some nonlinear Hammerstein integral equations and provide an iterative scheme for approximating solutions.

Keywords: chain-complete poset, fixed point, nonlinear Hammerstein integral equation.

MSC: 06A06, 06F30, 45G10, 45P05.

Mathematical programming for the sum of two convex functions with applications to Lasso problem, split feasibility problems and image deblurring problem

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In this paper, two iteration processes are used to find the solutions of the mathematical programming for the sum of two convex functions. In infinite Hilbert space, we establish two strong convergence theorems of this problem. As applications of our results, we give strong convergence theorems of the split feasibility problem with modified CQ method, strong convergence theorem of the lass problem, strong convergence theorems for the mathematical programming with modified proximal point algorithm and modified gradient projection method in the infinite dimensional Hilbert space. We also apply our result on lass problem to image deblurring problem. Some numerical examples are given to demonstrated our results. The main result of this paper gives a unified study of many types of optimization problems. Our algorithms to solve these problems are different from any results in the literature. Some results of this paper are original and some results of this paper improve, extend and unified comparable results existence in the literature.

Orbitally nonexpansive mappings

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We define a class of nonlinear mappings which properly contains the class of nonexpansive mappings. We also give two fixed point theorems for this new class of mappings.

Fixed point property and compactness in geodesic spaces

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Driven by the well known Klee's work about the topological properties of convex sets in locally convex linear spaces, we give a complete characterization of compact complete geodesic spaces with curvature bounded below in terms of the fixed point property for continuous functions. Furthermore, we provide an example which highlights the role of the sectional curvature in our result.

On the minimax inequalities and existence of equilibrium points

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Minimax theory plays an important role in many areas including optimization and game theory. Here, by using the KKM theory some versions of minimax inequalities are presented. Moreover, as an application of a Fan-Browder-type fixed point theorem, the existence of equilibrium points for a game is studied.

Fixed point theorems for Ćirić type generalized contractions defined on cyclic representations

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The purpose of this paper is to investigate the properties of some Ćirić type generalized contractions defined on cyclic representations in a metric space.

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Diametrically complete sets and normal structure

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A set is "diametrically complete" if it is not properly contained in any set with the same diameter and a set is "diametral" if it is not contained in any ball centered in its convex hull with radius strictly smaller than its diameter. I'll discuss some relationships between the two conceps, showing how it is possible to obtain diametrically complete sets with empty interior in some classes of reflexive spaces and how, in the same classes of spaces, existence of a diametral set is equivalent to the existence of a set which cannot be contained in a ball with radius smaller that its diameter, independently of the location of the center.

About Mann type methods and hierarchical fixed points

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A brief review of important results related to the Mann's iterative method from 1953 to today. The original method and some recent evolutions. The hierarchical fixed point problems as interesting development of these concepts.

Generalization of some fixed point results in Banach spaces

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We intend to generalize during the expected oral talk some fixed point results in general Banach spaces. Moreover, we give some important consequences of the obtained results as well as an illustrative example.

Coincidence points of non-self mappings/relations in tvs-cone metric spaces

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Weak contraction contains a huge class of contractive conditions. Weak contractive conditions are used for non-self multivalued mappings (from a closed subset into set of all closed subsets) of tvs-cone metric space to find the fixed points using Rothe's type condition. We also find the coincidence points of a nonself mapping (from a nonempty set into a tvs-cone metric space) and a relation. Moreover, some examples and applications for finding the solution of integral equations are given to illustrate the usability of our results. We generalize/extend many results present in literature.

A different approach to Mizoguchi-Takahashi type theorems via theta-contractions

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In this work, inspired by recent technique of Jleli and Samet, we give a new generalization of well-known Mizoguchi-Takahashi's fixed point theorem, which is the closest answer of Reich's conjecture about the existence of fixed points of multivalued mappings on complete metric space. Also, we provide a non-trivial example showing that our result is a proper generalization of Mizoguchi-Takahashi's result.

Existence of best proximity points for set - valued cyclic contractions

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Our goal in this paper is to extend the concept of cyclic contraction for single valued maps to set-valued maps and obtaining the existence of a best proximity point for such mappings in metric spaces with the UC property by a new method.

Keywords: Best proximity point; UC Property; set-valued cyclic contraction map.

MSC: 47H10, 54H25, 54C60

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Generalized nonexpansive mappings and a Krasnosel'skii theorem

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In recent years, several conditions which are more general than nonexpansiveness for mappings have arisen in the setting of fixed point theory. Among them, we will discuss condition (L) and others related to it, in order to:

1. Establish fixed point results under geometric conditions over the Banach space where they are defined.

2. Generalize Krasnosel'skii result for a sum of a compact mapping and a strict contraction.

On the role of coefficients about the strong convergence of general type iterative methods

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In recent years, the study of the strong/weak convergence of iterative methods has been widely investigated. In this talk, we want to show how the asymptotic behavior of the ratio of the coefficients involved in an iterative method influences the convergence of the algorithm itself.

Almost fixed point sequences for pseudo contractive mappings in unbounded domains

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Let C be a nonempty subset of a Banach space X and let $T : C \to X$ be a mapping. A sequence (x_n) in C is said to be an almost fixed point sequence for T whenever $\lim_{n\to\infty} \|T(x_n) - x_n\| = 0$. Mappings which do not increase distances between pairs of points and their images are called nonexpansive. Almost fixed point sequences for nonexpansive mappings play an important role in the study of fixed point theory for nonexpansive mappings. In certain instances, these sequences converge, in the strong sense or in the weak topology, to some fixed point. In other cases, these kind of sequences determine invariant sets which contain a fixed point. It is well known that each nonexpansive selfmapping of each nonempty closed bounded and convex subset of X has an almost fixed point sequence. When C is unbounded, the above is far from being true. However, there are necessary and sufficient conditions for the existence of bounded almost fixed point sequences for nonexpansive mappings in unbounded domains, for instances, the existence of bounded orbits for T, existence of nonempty bounded closed and convex T-invariant subsets, etc. In this talk we will discuss this problem for a class of mappings more general than nonexpansive mappings, called pseudocontractive (and strong pseudocontractive) mappings. We say that a mapping $T : C \to X$ is pseudocontractive if for all $x, y \in C$ we have that $\langle (I - T)(x) - (I - T)(y), x - y\rangle_+ \geq 0$, where $\langle \cdot, \cdot \rangle_+ : X \times X \to \mathbb{R}$ is defined by $\langle y, x\rangle_+ := \max\{j(y) : j \in J(x)\}$ and $J(x)$ is the normalized duality mapping at x. When $\langle (I - T)(x) - (I - T)(y), x - y\rangle_- \geq 0$ for all $x, y \in C$, we say that T is strong pseudocontractive, where $\langle \cdot, \cdot \rangle_- : X \times X \to \mathbb{R}$ is given by $\langle y, x\rangle_- := \min\{j(y) : j \in J(x)\}$. We say that $T : C \to X$ satisfies the Leray-Schauder's condition if there exist $x_0 \in C$ and $R > 0$ such that $T(x) - x_0 \neq \lambda(x - x_0)$ for all $\lambda > 1$ and for all $x \in C \cap S_R(x_0)$. We will see that, if C is a closed convex and unbounded subset of a Banach space X and if $T : C \to X$ is a continuous pseudocontractive mapping weakly inward on C satisfying the Leray-Schauder's condition, then there exists a bounded almost fixed point sequence for T in C. We will also see that, if the domain of a strong pseudocontractive mapping is unbounded, we have that Leray-Schauder's condition is the best one to guarantee the existence of a bounded almost fixed point sequence. Namely, if C is a closed convex and unbounded subset of a Banach space X and if $T : C \to X$ is a continuous strong pseudocontractive mapping weakly inward on C, then there exists a bounded almost fixed point sequence for T in C if, and only if, there exist $x_0 \in C$ and $R > 0$ such that $T(x) - x_0 \neq \lambda(x - x_0)$ for all $\lambda > 1$ and for all $x \in C \cap S_R(x_0)$.

Existence of positive solutions for singular fifth-order three-point boundary value problem

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In this article, we consider the boundary value problem

$$u^{(5)}(t) + f(t, u(t)) = 0, \quad 0 < t < 1,$$

subject to the boundary conditions

$$u(0) = u'(0) = u''(0) = u'''(0) = 0 \text{ and } u'''(1) - \alpha u'''(\eta) = \lambda.$$

In the setting, $0 < \eta < 1$ and $\alpha \in [0\frac{1}{\eta})$ are constants and $\lambda \in [0, \infty)$ is parameter. By placing certain restrictions on the nonlinear term f, we proof the existence of at least one positive solution to the boundary value problem with the use of the Krasnosel'skii fixed point theorem. The novelty in our setting lies in the fact that $f(t, u)$ may be singular at $t = 0$ and $t = 1$. We conclude with examples illustrating our results obtained in this paper.

Keywords and phrases: Fifth-order, Boundary value problem, Fixed point theorem, Parameters.

MSC:34B15, 34B40

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Reflexivity is equivalent to the perturbed fixed point property for cascading nonexpansive maps in Banach lattices

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Using a theorem of Domínguez Benavides and the Strong James Distortion Theorems, Lennard and Nezir recently proved that if a Banach space is a Banach lattice or has an unconditional basis, then it is reflexive if and only if it has an equivalent norm that has the fixed point property for cascading nonexpansive mappings. This new class of mappings strictly includes nonexpansive mappings. [Reflexivity is equivalent to the perturbed fixed point property for cascading nonexpansive maps in Banach lattices, Nonlinear Analysis 95 (2014) 414-420.]

The asymptotic behavior of the composition of firmly nonexpansive mappings

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We provide a unified treatment of some convex minimization problems in the setting of geodesic spaces that satisfy a uniform convexity assumption. This allows for a better understanding and, in some cases, improvement of results proved recently in this direction. For this purpose, we analyze the asymptotic behavior of compositions of finitely many firmly nonexpansive mappings focusing on asymptotic regularity and convergence results.

On systems of nonlinear functional differential equations of fractional order

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In this talk, we intend to present a study of some systems of nonlinear functional differential equations of fractional order. The proposed analysis is based on the choice of the adequate functional context, and the use of appropriate fixed point theorems.

Some best proximity point theorems for Geraghty contractions with Suzuki distances

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In this paper,we define the p-Geraghty contraction in which p is a generalized distance on a metric space. Then, we prove the existence of a best proximity point for p-Geraghty contractive non-self mappings in a complete metric space. Also we define two kinds of Geraghty's p-proximal contractions and prove some best proximity point theorems such that our results are extension of previous research.

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Time fractional inhomogeneous parabolic equation with mixed boundary conditions

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This article deals with the mathematical analysis of the inverse problem of identifying the distinguishability of input-output mappings in the linear time fractional inhomogeneous parabolic equation

$$D_t^{\alpha} u(x,t) = (k(x)u_x)_x + r(t)F(x,t) \quad 0 < \alpha \leq 1,$$

with mixed boundary conditions

$$u(0,t) = \psi_0(t), u_x(1,t) = \psi_1(t).$$

By defining the input-output mappings $\Phi[\cdot] : \mathcal{K} \to C^1[0,T]$ and $\Psi[\cdot] : \mathcal{K} \to C[0,T]$ the inverse problem is reduced to the problem of their invertibility. Hence, the main purpose of this study is to investigate the distinguishability of the input-output mappings $\Phi[\cdot]$ and $\Psi[\cdot]$. Moreover, the measured output data $f(t)$ and $h(t)$ can be determined analytically by a series representation, which implies that the input-output mappings $\Phi[\cdot] : \mathcal{K} \to C^1[0,T]$ and $\Psi[\cdot] : \mathcal{K} \to C[0,T]$ can be described explicitly, where $\Phi[r] = k(x)u_x(x,t;r)|_{x=0}$ and $\Psi[r] = u(x,t;r)|_{x=1}$.

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Generalized fixed point theorems for multi-valued mappings

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In this study, we establish some fixed point results for multi valued as well as single valued maps satisfying generalized contractions in complete spaces which unify and generalize several results due to Fisher, Hardy- Rogers and others.

Fixed point theorems for a generalized Presić operators in the sense of Berinde type in orbitally complete metric spaces endowed with graphs

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In this work, we introduce a generalized Presić operators in the sense of Berinde type and show some fixed point theorems for such considered operators in thee setting of orbitally complete metric spaces endowed with graphs.

Recent results and open problems in fixed point theory for multivalued operators

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In this talk, we will present recent results in fixed point theory for self and nonself multivalued operators. Several open problems in the context of the fixed point structures theory are also given.

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An iterative process for a hybrid pair of generalized asymptotically nonexpansive single-valued and generalized nonexpansive multi-valued mappings in Banach spaces

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In this talk, we introduce an iterative process involving a hybrid pair of a finite family of generalized asymptotically nonexpansive single-valued mappings and a finite family of generalized nonexpansive multi-valued mappings and prove weak and strong convergence theorems of the proposed iterative process in Banach spaces. We also give a numerical example to support our main results. Our main results extend and generalize many results in the reference therein.

Lindenstrauss spaces whose duals lack the weak* fixed point property for nonexpansive mappings

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A Banach space X is called an L_1-predual space or a Lindenstrauss space if its dual is isometric to $L_1(\mu)$ for some measure μ. We present several characterizations of all separable Lindenstrauss spaces X inducing the failure of the weak* fixed point property in $X^\star$.

Unbounded sets and nonexpansive mappings in spaces of negative curvature

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We give an affirmative answer to the question of whether the geodesically boundedness property is a necessary and sufficient condition for a closed convex subset K of a space of negative curvature, to have the fixed point property for nonexpansive mappings.

Some best proximity results

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The aim of the talk is to present some results on best proximity points, by means of the concepts of (P)-property, weak (P)-property, the comparison function and generalized almost (β, θ)-Geraghty contractions. Some examples are provided to support the useability of our results.

Existence of semilinear neutral impulsive mixed integrodifferential inclusions of Sobolev type in Banach spaces

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In this paper, we prove the existence of mild solutions for semilinear neutral impulsive mixed integrodifferential inclusions of Sobolev type with nonlocal initial conditions. The results are obtained by using a fixed point theorem for multi-valued maps on locally convex topological spaces.

Keywords: Existence, neutral impulsive equation, integrodifferential inclusion, convex multi-valued map, fixed point theorem.

MSC: 34A12, 34A60, 47D06, 34G20, 45N25.

Some results in fixed point theory and application to the convergence of some iterative processes

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In this work, we give some results concerning the existence and uniqueness of fixed point satisfying rational expressions, generalizing those of B. Ray, M.S. Khan and W. Kirk. These contributions are used to establish the convergence and stability of some iterative process.

Fixed point theorems with applications to electrical engineering

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In this paper the concept of set-valued p-cyclic contraction map is introduced. The existence of best proximity point for such mappings on a metric space with the UC property is presented. Also, we obtain some applications to economic and electrical engineering.

Keywords: Best proximity point, Property UC, Set-valued p-cyclic contraction map.

MSC: 47H10, 54H25, 54C60

Positive solutions of a nonlinear second-order boundary value problem with three-point integral boundary conditions

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In this talk we show the existence of at least one positive solution for a three-point integral boundary value problem for a second order nonlinear differential equation. The existence and uniqueness result is obtained by using the a priori estimation method of fixed points for condensing maps. Therefore, we do not need local assumptions such as superlinearity or sublinearity of the involved nonlinear functions. Instead, we can assume the global Lipschitz continuity condition of the involved nonlinear functions.

Common fixed point theorems under $(R, \mathcal{S})$-contractivity conditions

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Very recently, Roldán-López-de-Hierro and Shahzad introduced the notion of R-contractions as an extension of several notions given by different researchers (for instance, R-contractions generalize Meir-Keeler contractions, $\mathcal{Z}$-contractions –involving simulation functions– by Khojasteh *et al.*, manageable contractions by Du and Khojasteh, Geraghty's contractions, Banach contractions, etc.). In this manuscript, we use R-functions in order to obtain existence and uniqueness coincidence (and common fixed) point results under a contractivity condition that extend some well known contractive mappings in the field of fixed point theory. In our main theorems, we employ a binary relation on the metric space that has not to be a partial order. Finally, we illustrate our technique with an example in which other previous statements (like Dutta and Choudhury's theorem, among others) cannot be applied.

Keywords: R-function , R-contraction, Meir-Keeler contraction, Simulation function, Manageable function, Fixed point theorem

On strong convergence of Halpern's method for quasi-nonexpansive mappings and for strongly quasi-nonexpansive mappings in Hilbert Spaces

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In this talk, I will present two Halpern's type methods which converge to different fixed points, depending on the assumptions of the control coefficients. The first algorithm approximates common fixed points of two averaged type mappings T_δ, S_δ, where T, S are quasi-nonexpansive mappings such that $I-T$ and $I-S$ are demiclosed at 0, in the setting of Hilbert spaces. Moreover, a numerical example of the iterative scheme is given. The second algorithm does not involve the averaged type mappings but the strongly quasi-nonexpansive mappings.

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Some convergence results for nearly asymptotically nonexpansive nonself mappings in CAT(κ) spaces

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In this paper, we prove the strong and $\triangle$-convergence theorems of an iteration process for nearly asymptotically nonexpansive nonself mappings on CAT(κ) spaces with $\kappa > 0$. Our results extend and improve some recent results announced in the current literature.

Keywords: Nearly asymptotically nonexpansive nonself mappings, Fixed point, Strong convergence, $\triangle$-convergence, CAT(κ) space.

MSC: 47H09, 54H25

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An alternating minimization method for robust principal component analysis

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We focus on solving the problem of robust principal component analysis (RPCA) arising from many applications in the fields of information theory, statistics, engineering, etc. The nuclear norm based RPCA model can be solved by a bunch of existing algorithms. However, these algorithms need to compute Singular Value Decomposition (SVD) which is expensive. We propose an alternating minimization method for solving it. The new algorithm shows satisfactory speed performance, and its theoretical property is also analyzed.

Spaces of convex sets

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Let $C(X)$ denote the set of all non-empty closed bounded convex subsets of a normed linear space X. In 1952 Hans Rådström described how $C(X)$ equipped with the Hausdorff metric could be isometrically embedded in a normed lattice with the order an extension of set inclusion. We call this lattice the *Rådström* of X and denote it by $R(X)$. We will:

(a) outline Rådström's construction,

(b) survey the Banach space structure and properties of $R(X)$, including; completeness, density character, induced mappings, inherited subspace structure, reflexivity, and its dual space,

(c) explore possible synergies with metric fixed point theory.

Fixed point results through generalized contractive conditions in G-metric spaces

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A new type of contractive mapping known as an F-contraction has been introduced by Wardowski [1] for a metric space recently in 2012. Utilizing the notion of F-contraction, Wardowski [1] proved a fixed point theorem which generalizes Banach contraction principle in a different way than in the known results from the literature. Very recently, Piri et al. [2] enhanced the concept of $F-$contraction by employing some weaker conditions on mapping F and proved certain fixed point results in metric spaces.
The purpose of this paper is to acknowledge the idea of Piri et al. [2] to define modified $F-$contractive mappings in the structure of G-metric spaces. By highlighting the role of modified $F-$contraction and by adopting the technique specified in Karapınar et al.[3], some fixed point theorems in the framework of G-metric spaces are proved. Our results cannot be concluded from the existing results in the milieu of associated metric spaces.
Some examples are presented which substantiate the utility of hypothesis of our results.

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Some fixed point approximations in nonlinear spaces

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In this lecture, we study some fixed point approximations for continuous mappings in nonlinear spaces. Also, we introduce the concept of the stable fixed point property for mappings, and we prove the existence of the stable fixed point property for mappings in such spaces.

Fixed point theorems and some approximation methods for G-nonexpansive mappings in Banach spaces endowed with a directed graph

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In this talk, we first introduce a new type of nonexpansive mappings, called G-nonexpansive mappings, in a Banach space with a directed graph, and then we prove some existence results for this type of mappings. We also prove weak and strong convergence of some approximation methods to a fixed point of those mappings under some control conditions. Our results extend and generalize many known results in the literature.

Properties of contractions and nonexpansive mappings on spherical caps in Hilbert spaces

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Let H be a real Hilbert space of dimension at least 2 with inner product $\langle \cdot, \cdot \rangle$ and unit sphere S. Given $n \in S$, we define an α-spherical cap by $S_\alpha = \{x \in S : \langle x, n \rangle \geq \alpha\}$, where $\alpha \in [-1, 1]$. We show that the distance between the set of contractions $T : S_\alpha \to S_\alpha$ and the identity mapping is positive if and only if $\alpha < 0$. We also study the fixed point property and the minimal displacement problem in this setting for nonexpansive mappings.

On the attractors of local systems of expanding maps

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A system $\mathbf{S} = \{S_1, ..., S_m\}$ of contraction maps in a complete metric space X gives rise to a contraction operator $T : C(x) \to C(X)$ in the hyperspace $C(X)$ defined by the equation $T(A) = \bigcup_{i=1}^{m} S_i(A)$. Therefore it has an attracting fixed point K, i.e. such compact set $K \subset X$ that for any compact $A \subset X$, $\lim T^n(A) = K$. It is essential in this situation that the maps S_i are contractions. This is a classical definition of self-similar fractals due to Hutchinson [1]. It seems clear that if S_i are expanding maps, then the operator $T(A)$ cannot have an attractor. Nevertheless, for local systems, defined by M.Barnsley, M.Hegland and P.Massopust [2] the situation is strikingly different. We construct and study such local systems of expanding maps $\mathbf{S} = \{(S_i, U_i), i = 1, ..., m\}$ on the unit interval $I = (0, 1)$ which define the operators $T(A) = \bigcup_{i=1}^{m} S_i(A \cap U_i)$ possessing the following properties:

1. There is such compact set $K \subset I$, that $T(K) = K$
2. For any compact $A \subset I$ there is such n, that $T^n(A) \subset K$.

This means that the set K is a fast attractor of the system $\mathbf{S}$. Moreover, we prove that the set K is a finite union of disjoint segments in I.

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On the construction of metrics from fuzzy metrics and its application to the fixed point theory of multivalued maps

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In his paper "Some suitable metrics on fuzzy metric spaces" (Fixed Point Theory 5 (2004), 323-347), V. Radu presented a procedure to construct certain suitable metrics from fuzzy metrics in the sense of Kramosil and Michalek. Here we give a modification of Radu's procedure, which is applied to obtain a fixed point theorem of Caristi's type for multivalued maps on complete fuzzy metric spaces.

Application of faint compatibility to Ćirić and Hardy-Rogers type F-contractions

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In many fields, equilibria or stability are fundamental concepts that can be described in terms of fixed points. After locating these fixed points in a system, the stability of each fixed point can be determined which enables engineers /scientist to establish how the system is functioning and its responses to future conditions.The aim of this paper is to discuss the existence and uniqueness of coincidence and common fixed point of noncompatible single valued maps via faint compatibility using Ćirić and Hardy-Rogers type F-Contractions. Our result generalizes, extend and improves the result of Wardowski [D. Wardowski, Fixed points of a new type of contractive mappings in complete metric spaces, Fixed Point Theory and Applications, (2012) 2012: 94, 6 pages , doi: 10.1186/1687-1812-2012-94] and others existing in literature without completeness or closedness of space/subspace, containment and continuity requirement of involved maps. Examples are also furnished in support of our result.

One step iteration scheme for multi-valued nonexpansive mappings in $CAT(0)$ spaces

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In this talk, we introduce one step iteration scheme involving multi-valued nonexpansive mappings in $CAT(0)$ spaces and utilize the same to prove Delta A-convergence as well as strong convergence theorems.

Generalizations of Darbu's theorem and applications in study of functional-integral equations

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Compactness plays an essential role in the proof of existence theorem for solutions of nonlinear differential and integral equations (Nonlinear Operator Equation). However, there are some important problems in nonlinear sciences where the operators are not compact. In such a situation the Measure of noncompactness and Darbu's theorem are so helpful. In this talk we will review this topic.

Chebyshev centers and fixed point theorems

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Brodskii and Milman proved that there exists a point in $C(A)$, the set of all Chebyshev centers of A, which is fixed by every surjective isometry from A into A, whenever A is a nonempty weakly compact convex set having normal structure in a Banach space. Motivated by this result, Lim et. al raised the following question :

Let A be a nonempty weakly compact convex subset of a Banach space and assume that A has normal structure. Does there exist a point in $C(A)$ which is fixed by every isometry from A into A ?

In this talk it is aimed to discuss some recent results obtained in this direction and some related results in best proximity point theorems.

The fixed point property in Sobolev spaces

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It was conjectured for some time that every nonexpansive mapping $T : C \to C$ acting on a weakly compact convex subset of a Banach space X has a fixed point. This conjecture was disproved by Dale Alspach [Proc. Amer. Math. Soc. 82 (1981), 423–424] who discovered an example of an isometry on a weakly compact convex subset of $L^1[0,1]$ without fixed points. A natural question is whether the same holds true for Sobolev spaces $W^{k,1}(U)$. In this talk we show that if U is a bounded open subset of $\mathbb{R}^n$ with the boundary ∂U of class $C^1, n \geq 1$, then the Sobolev space $W^{1,1}(U)$ has the fixed point property for nonexpansive mappings on weakly compact convex sets. Some renormings of $W^{1,p}(U), 1 \leq p \leq \infty$, have this property too.

Some results for state dependent sweeping process

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In this work, we prove the existence of solutions of a class of variational inequalities known as the so-called second order "sweeping process" with perturbations. We deal with the nonconvex case using some definition of uniformly prox regular sets. Moreover, the perturbation isn't necessary bounded nor with compact values.

A hybrid iteration method for a finite family of I-asymptotically nonexpansive mappings

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In this paper, we establish a new hybrid iteration method for a finite family of I-asymptotically nonexpansive mappings. Under suitable assumptions, we prove strong and weak convergence theorems for common fixed points of the mappings $\{T_1, T_2, \ldots, T_m\}$ and $\{I_1, I_2, \ldots, I_m\}$

Keywords: I-asymptotically nonexpansive, common fixed point, hybrid iteration method, convergence theorems.

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Fixed points of R-weakly commuting mappings in multiplicative metric space

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In this paper, we present a unique common fixed point theorem for pointwise R-weakly commuting maps in complete multiplicative metric space. Another result for R-weakly commuting of type (P) is also established. Our results generalized the results of the main theorem of He *et al.* (Common fixed points for weak commutative mappings on a multiplicative metric space) by using R-weakly commuting maps.

Applications of order-theoretic fixed point theorems to discontinuous quasi-equilibrium problems

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We apply order-theoretic fixed point theorems and isotone selection theorems to study quasi-equilibrium problems. Some existence theorems of solutions to quasi-equilibrium problems are obtained on Hilbert lattices, chain-complete lattices and chain-complete posets, respectively. In contrast to many papers on equilibrium problems, our approach is order-theoretic and all results obtained in this paper do not involve any topological continuity with respect to the considered mappings.

Poster Session

Second order differential inclusions with almost convex multifunctions

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We study the existence of solutions of a boundary second order differential inclusion in a finite dimensional space, where the set valued mapping is upper semi continuous with almost convex values.

Bilateral contact problem with adhesion between two bodies for viscoelastic with long-term memory and damage

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We consider a quasistatic contact problem between two viscoelastic bodies with long-term memory and damage. The contact is bilateral and the tangential shear due to the bonding field is included. The adhesion of the contact surfaces is taken into account and modeled by a surface variable, the bonding field. We prove the existence of a unique weak solution to the problem. The proof is based on arguments of time-dependent variational inequalities, parabolic inequalities, differential equations and fixed point.

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Fixed points, eigenvalues and surjectivity for quasi-bounded operators under weak topology circumstances

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We prove some new fixed point theorems for quasi-bounded operators in weak topology setting of non reflexive Banach space which extend, in a broad sense, analogous results obtained by S. K. Anoop and K. T. Ravindran in 2011. Applications of the newly developed fixed point theorems are also discussed for proving the existence of positive eigenvalues and surjectivity of quasi-bounded operators in similar situations. By assuming the weak semiclosedness property we state a series of new fixed point theorems for weakly nonexpansive operators. Moreover, we study the existence of fixed point for (ws) -compact and quasi-bounded operators. The assumptions of our main results are formulated in terms of weak topology and an axiomatic definition of measure of weak noncompactness.

Semilinear elliptic equations in cylindrical domain

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We study in this work the question of a existence of weak solution for a semilinear elliptic equation in a cylindrical domain. the approch is based on identities integral of Pohozaev type.

Researcher of free surface in rectangular basin and progressive waves

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The study established in this poster is to find the equation of free surface of a long gravity wave in a rectangular basin with horizontal bottom. Applying the shallow water theory and approximating by perturbation scheme called "small parameter Poincare". The unknown function at a free surface is developed in small parameter ε series which is the main objective in this work. For illustration, we take as example a progressive wive and the numerical simulations were performed to interpret the mathematical model.

Keywords: Free surface, long gravity waves, Shallow water theory

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Linear combinations of 2-orthogonal polynomials: generation and decomposition problems

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In this work we are interested in the study of the 2-orthogonality of sequences of monic 2-orthogonal polynomials $\{P_n\}_{n\geq 0}$ and $\{Q_n\}_{n\geq 0}$ satisfying the relation

$$Q_{n+1}(x) = P_{n+1}(x) + \alpha_{n+1}P_n(x), n \geq 0, \text{where } \alpha_n, n \geq 1,$$

are nonzero complex numbers. The sequence $\{Q_n\}_{n\geq 0}$ is said to be generated from 2 terms of the sequence $\{P_n\}_{n\geq 0}$ and the sequence $\{P_n\}_{n\geq 0}$ is said to be a decomposition of the sequence $\{Q_n\}_{n\geq 0}$ with 2 terms. First, we give necessary and sufficient conditions ensuring the 2 -orthogonality of the sequence $\{Q_n\}_{n\geq 0}$ assuming that of the sequence $\{P_n\}_{n\geq 0}$ is 2-orthogonal. Second, assuming the sequence $\{Q_n\}_{n\geq 0}$ is $2-$ orthogonal we get necessary and sufficient conditions for the existence of a sequence $\{P_n\}_{n\geq 0}$ satisfying the above relation and such that it is $2-$orthogonal. Indeed, we characterize the 2-orthogonality of these sequences in terms of the coefficients of the corresponding four term recurrence relations. Next, we study our problem as an inverse problem for 2-monic orthogonal polynomials, *i.e.* if $U = (u_0, u_1)^T$ and $V = (v_0, v_1)^T$ are the regular bi-dimensional vector functionals associated with the sequences $\{P_n\}_{n\geq 0}$ and $\{Q_n\}_{n\geq 0}$, then we deduce the relation between them. Furthermore, the relation between the banded Hessenberg matrices associated with the multiplication operator in terms of the bases $\{P_n\}_{n\geq 0}$ and $\{Q_n\}_{n\geq 0}$ is analyzed. Finally, we give many examples of such related 2-orthogonal polynomial sequences.

Application of equilibria and fixed point theory in solving differential equations

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In this poster, we treat the linear and nonlinear ordinary differential equations (ODE) and show their importance in our real life. In further, we explain techniques for solving ordinary differential equations based on finding the equilibria using the fixed point theory and studying their behavior:

Keywords: Fixed Point, Equilibrium, Stability, Differential equation.

MSC: 37C10, 37C25, 37C75

Periodicity in neutral nonlinear dynamic equation with functional delay on time scale

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Let T be periodic time scale. In this paper, we use a modification of Krasnoselski's fixed point theorem due to Burton to show the existence of periodic solution on time scale of nonlinear neutral dynamic equation functionals delay

$$\begin{aligned} x^{\Delta}(t) &= -a(t)h(x^{\sigma}(t)) + (Q(t,x(t),x(t-g(t))))^{\tilde{\Delta}} \\ &\quad +f(t,x(t),x(t-g(t))) \end{aligned}$$

$t \in T$ where f^{Δ} is the $\Delta-$derivative on T and $f^{\tilde{\Delta}}$ is the $\Delta-$derivative on $(id-r)T$. We transform it to an integral equation for obtaining tow mappings, one is large contraction and the other is compact.

Keywords: Time scales, Nonlinear neutral dynamic equation equation, Periodic solution, Contraction mapping, Integral equation.
MSC: 34K20, 45J05,45D05

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Multi-point boundary value problems of fractional Caputo differential equations

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The theory of differential equations of fractional order arises in many scientific disciplines, such as physics, chemistry, electrochemistry, control theory, image and signal processing, biophysics. For more details, we refer the reader to [2, 3, 4, 5] and references therein. Recently, there has been an important progress in the investigation of these equations, (see [1, 2, 3]). More recently, some basic theory for the initial boundary value problems of fractional differential equations has been discussed in [4, 5]. Moreover, the multi-point boundary value problems for differential equations arise in many fields of applied mathematics and physics. We refer the reader to [1, 2, 4, 5] for some applications. In this work, we study a multi-point boundary value problem of nonlinear fractional differential equations. The existence and uniqueness of solutions is derived from Banach's contraction principle. We also prove other existence results using Schaefer fixed point theorem.

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Positive solutions to quasilinear elliptic systems

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In this work, we establish existence and regularity of positive solutions for a class of singular quasilinear elliptic system. The nonlinearities involved have semipositone and positone structures with the combined superlinear condition near infinity. The approach is based on sub-supersolution methods for systems of quasilinear singular equations and the Schauder's fixed point Theorem.

Fixed points of set-valued mappings on b-metric spaces

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In this presentation, we study and generalize the concept of set-valued weak contraction of Berinde and Berinde.

Nonlinear problems for second order differential inclusions with mixed semi-continuous perturbations

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In this work, we study a class of nonlinear boundary problems for a second order differential inclusion governed by a maximal monotone operator and a nonlinear perturbation, which is mixed semi-continuous and satisfies the generalized Hartman condition. Using fixed point theorems for set-valued maps and the theory of monotone operators, an existence theorem of solutions is given.

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Existence of solutions for a second order boundary value problem with the Clarke subdifferential

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In this work, we prove a theorem on the existence of solutions for a second order differential inclusion governed by the Clarke subdifferential of a Lipschitz function and a mixed semicontinuous perturbation.

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Approximation of the unilateral contact problem by the finite element method

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Several problems in mechanics, physics, control and those dealing with contacts, lead to the study of systems of variational inequalities. In this study we considered a deformed elastic solid with a unilateral contact of a rigid body. This model has been studied by J.L. Lions and G. Stampacchia [4]. In this paper, we studied the existence, uniqueness and continuity of the deformation of this solid with respect to the data.

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