SEAM 2016

32nd Southeastern Analysis Meeting
University of South Florida, Tampa
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TITLES AND ABSTRACTS OF SUGGESTED TALKS

Afrah A. N. Abdou, King Abdoulaziz University (aabdou@kau.edu.s)
Title: *Common fixed point theorems for hybrid contractive pairs with the (CLR)-property*

Abstract: In this work, we introduce the (CLR)-property for the hybrid pairs of single-valued and multi-valued mappings and give some coincidence and common
xed point theorems for the hybrid pairs of some contractive conditions. Also, we will give some examples to illustrate the main results in this paper. Our results extend and improve some results given by some authors

Tom Alberts, University of Utah (alberts@math.utah.edu)
Title: *Random geometry in the spectral measure of the circular beta ensemble*

Abstract: The Circular Beta Ensemble is a family of random unitary matrices whose eigenvalue distribution plays an important role in statistical physics. The spectral measure is a canonical way of describing the unitary matrix that takes into account the full operator, not just its eigenvalues. When the matrix is infinitely large (i.e. an operator on some infinite-dimensional Hilbert space) the spectral measure is supported on a fractal set and has a rough geometry on all scales. This talk will describe the analysis of these fractal properties. Joint work with Raoul Normand and Balint Virag.

Shelly Arora, Punjabi University, Patiala, India (shellya@mail.usf.edu)
Title: *Applications of hypergeometric techniques to analysis of singular perturbation problems*

Abstract: Time dependent Singular perturbation problems are widely used in the field of applied mathematics, physics, chemical engineering etc. In these problems the perturbation parameter is multiplied to the highest order derivative in space domain. In present study hypergeometric functions have been discussed to analyze the error estimate of numerical solution of singular perturbation problems.

Date: March 15, 2016.

Meric Augat, University of Florida (mlaugat@ufl.edu)
Title: *Free polynomial Biholomorphisms between free spectrahedra*

Abstract: Linear Matrix Inequality (LMI) Domains are bounded free convex semialgebraic sets. Along with their commutative counterparts, they appear in a host of fields including convex optimization, semidefinite programming, convex real algebraic geometry and systems theory. We consider free polynomial mappings between LMI Domains, polynomial equivalence versus affine linear equivalence, and automorphisms for certain classes of domains. We produce a class of pairs of LMI domains that are polynomially, but not affine linearly, biholomorphic.

Seher Aydogan, College at Brockport (saydogan@brockport.edu)
Title: *New distortion theorems for Sakaguchi functions*

Abstract: Let $\mathcal{A}$ be the class of functions $f(z)$ that which are regular and satisfying the conditions $f(0) = 0$, $f'(0) = 1$. In other words each $f(z)$ in $\mathcal{A}$ has the power series representation $f(z) = z + a_2z^2 + a_3z^3 + ...$ that are analytic in the open unit disc $\mathbb{D} = [z||z| < 1]$. In 1959, K. Sakaguchi, has considered the subclasses of $\mathcal{A}$ consisting of those $f(z)$ which satisfy $\mathrm{Re}\frac{zf'(z)}{f(z)-f(-z)} > 0$ where $z \in \mathbb{D}$. We call such a function as Sakaguchi functions and denote the class of those functions by SS. Various authors have investigated these functions. In this talk, we obtain some results and distortion inequalities for Sakaguchi functions.

Snehalatha Ballamoole, Mississippi State University (sb1244@msstate.edu)
Title: *Integral operators on the Zygmund spaces on the unit disk*

Abstract: We consider a class of integral operators

$$T_{\mu,\nu}f(z) := z^{\mu-1}(1-z)^{-\nu}\int_0^z w^{-\mu}(1-w)^{\nu-1}f(w)dw$$

on the Zygmund space $\mathcal{Z}$ of the unit disk. Specifically, we obtain the boundedness, spectrum and the point spectrum of $T_{\mu,\nu}$ on $\mathcal{Z}$. We also obtain necessary and sufficient conditions for a multiplication operator to be bounded below on the Zygmund space. This enables us to identify the spectrum of $T_{\mu,\nu}$ on the Zygmund space.

Debendra Banjade, Coastal Carolina University (dpbanjade@coastal.edu)
Title: *Estimates for the Corona theorem on $H^\infty_{\mathbb{I}}(\mathbb{D})$*

Abstract: Let $\mathbb{I}$ be a proper ideal of $H^\infty(\mathbb{D})$. We prove the corona theorem for infinitely many generators on the subalgebra $H^\infty_{\mathbb{I}}(\mathbb{D})$, in which the corona theorem for finitely many functions is known to hold. This settles the conjecture of Ryle. Moreover, we prove a generalized Wolff's Ideal Theorem for this sub-algebra.

Laurent Baratchart, INRIA-Sophia-Antipolis, France (Laurent.Baratchart@inria.fr)
Title: *On unique continuation of solutions to elliptic equations*

Abstract: Whether a nonzero harmonic function in a domain can vanish together with its normal derivative on a subset of positive measure of the boundary is a classical issue, connected with inverse problems and, in dimension 2, Privalov's uniqueness theorem. We will take up this issue for solutions to conductivity equations $div(\sigma\nabla u) = 0$. In dimension 3 and higher, the surprising answer is yes, due to a famous counterexample of Wolff. In dimension 2 the answer is no under rather general assumptions.

Buthinah Bin Dehaish, King Abdulaziz University, Saudi Arabia (bbendehaish@kau.edu.sa)
Title: *An approximation of monotone Lipchitzian mappings on Banach Spaces*

Abstract: Let $(X, \|.\|)$ be a Banach space. Let C be a nonempty, bounded, closed and convex sunset of X and $T : C \to C$ be a Lipchitzian mapping. In this talk we will study the convergent of the fixed point of Lipchitzian by using successive iteration process.

Jonathan Burns, Princeton University & University of South Florida (jtburns@mail.usf.edu)
Title: *Hypergeometric regression for probability distributions through moment ratios*

Abstract: Polynomial regression is computationally convenient, but asymptotically incompatible with the probability density functions for most of the classic distributions. Since many distributions have a hypergeometric form, we introduce a regression method that uses the sequential ratios of consecutive higher order moments to fit a dataset to a family of hypergeometric functions that contains many of the classic distributions. Finally we extend this regression method, using fractional moments, to avoid the increased variance associated with estimates of high order moments.

Wanqing Cheng, University of Arkansas, Fayetteville (wcheng@uark.edu)
Title: *The L^2 isometry of a generalized Ahlfors-Buerling transform on the n-sphere*

Abstract: The Ahlfors-Beurling transformation plays an important role in solving Beltrami equation. In this talk we use Cayley transformation to transfer a generalization of complex pi-operator in Euclidean space to the n-sphere and develop some properties of this operator This includes isometry results for an L^2 space over the sphere. To the end, an application of pi-operator to the solution of a spherical Beltrami equation will be studied. This is joint work with John Ryan.

Zeljko Cuckovic, University of Toledo (cuckovi@math.utoledo.edu)
Title: *Mapping properties of weighted Bergman projections on Reinhardt domains*

Abstract: We show that on smooth complete Reinhardt domains, weighted Bergman projections corresponding to exponentially decaying weights are unbounded on L^p spaces for all $p \neq 2$. On the other hand, we also show that the exponentially weighted projection operators are bounded on Sobolev spaces on the unit ball. This is joint work with Yunus Zeytuncu.

Matteo Dalla Riva, The University of Tulsa (matteo-dallariva@utulsa.edu)
Title: *A mixed problem in a domain with moderately close holes*

Abstract: I will present an application of a functional analytic approach in a mixed boundary value problem for the Laplace equation in a domain with two moderately close small holes, i.e. with two perforations such that the distance between them tends to zero "not faster" than the respective sizes. The talk is based on a joint paper with P. Musolino (Comm. Partial Differential Equations 2016).

Chao Ding, University of Arkansas, Fayetteville (dchao@uark.edu)
Title: *Higher order fermionic and bosonic operators*

Abstract: In this talk, we study a particular class of higher order conformally invariant differential operators acting on functions taking values in particular finite dimensional irreducible representations of the Spin group. The differential operators can be seen as a generalization to higher spin spaces of kth-powers of the Euclidean Dirac operator. To construct these operators, we must use the framework of Clifford analysis, in which irreducible representations of the Spin group can be realized as polynomial spaces satisfying a particular system of differential equations. As a consequence, these operators take values in the space of homogeneous harmonic or monogenic polynomials depending on the order. Moreover, we classify these operators in analogy with the quantization of angular momentum in quantum mechanics to unify the terminology used in studying higher order higher spin conformally invariant operators: for integer and half-integer spin, these are respectively bosonic and fermionic operators.

Guangwei Fan, Maryville University (gfan@maryville.edu)
Title: *Generalized extreme value theory and its applications in advanced age USA mortality*

Abstract: In this presentation, we introduce an analysis of generalized extreme value theory and its applications to USA advanced age mortality study. Our studied focuses on generalized Pareto extreme value theory, including the study of models, the estimation of parameters, and the asymptotic behavior. Applications of the extreme theory to the study of the limiting age of USA male and female populations are given.

Nathan S. Feldman, Washington & Lee University (feldmanN@wlu.edu)
Title: *Invariant convex sets for linear operators*

Abstract: We will discuss invariant convex sets for matrices, self-adjoint operators, and diagonalizable normal operators. We are particularly interested in when the closed invariant convex sets for the operator are the same as its closed invariant subspaces. This is joint work with Paul McGuire.

Matthew Fleeman, University of South Florida (mcfleema@mail.usf.edu)
Title: *Approximating $\overline{z}$ in the Bergman space and Bergman analytic content*

Abstract: In this talk we will classify the best approximation to $\bar{z}$ in the Bergman space in terms of the solution to a Dirichlet problem, and look at several examples where the best approximation to $\bar{z}$ is either a monomial or a rational function. We also examine the related problem of finding the Bergman analytic content of a domain, which is given by $\inf_{f\in A^2(\Omega)} \|\bar{z} - f\|_2$. We give an explicit formula for Bergman analytic content when Ω is a quadrature domain with polynomial map, as well as show that the Bergman analytic content of a simply connected domain is equivalent to the square root of the *torsional rigidity* from classical elasticity theory. This talk is on joint work with Dmitry Khavinson and Erik Lundberg.

Stephen J. Gardiner, University College Dublin, Ireland (stephen.gardiner@ucd.ie)
Title: *Universal series and potential theory*

Abstract: Many different avenues of research in mathematical analysis have led to the discovery of objects which possess universal approximation properties. Such objects often turn out to be generic rather than exceptional. This talk will focus on this phenomenon particularly in respect of the Taylor series of a holomorphic function, and how the partial sums behave outside the domain of the function. It will describe how potential theory has recently led to new insights about such functions.

Paul Gauthier, Université de Montréal (gauthier@dms.umontreal.ca)
Title: *Zero(pole)-free approximation and the Riemann hypothesis*

Abstract: Zero-free polynomial approximation is related to the Riemann hypothesis via Voronin's universality theorem. In the spherical distance, zero-free and pole-free approximation are of course equivalent.

Anatolii Grinshpan, Drexel University (tolya@math.drexel.edu)
Title: *Contractive determinantal representations of stable polynomials*

Abstract: We will discuss contractive determinantal representations of multivariable complex polynomials nonzero on the closure of a matrix polyball or a more general bounded domain. Coauthors: Dmitry S. Kaliuzhnyi-Verbovetskyi, Victor Vinnikov, and Hugo J. Woerdeman.

Arcadii Grinshpan, University of South Florida (agrinshp@usf.edu)
Title: *A multiple convolution inequality*

Abstract: Weighted multiple convolution inequalities are of increasing importance in various fields of mathematics and physics. A new multiple convolution inequality for complex-valued functions with respect to Dirichlet-Carlson measure will be presented. This inequality is sharp for any number of functions and it leads to some interesting applications.

Bingyang Hu, University of Wisconsin, Madison (Bhu2@e.ntu.edu.sg)
Title: *Composition operators on $\mathcal{N}_p$ space in the unit ball*

Abstract: Let $p > 0$, dV the normalized Lebesgue measure on the unit ball $\mathbb{B}$ in $\mathbb{C}^n$, $\mathcal{O}(\mathbb{B})$ be the collection of all holomorphic functions in the $\mathbb{B}$ and Φ_a be the automorphism of $\mathbb{B}$ with respect to $a \in \mathbb{B}$. The $\mathcal{N}_p$-space in the unit ball is defined as

$$\mathcal{N}_p := \left\{ f \in \mathcal{O}(\mathbb{B}) : \|f\|_p^2 = \sup_{a\in\mathbb{B}} \int_{\mathbb{B}} |f(z)|^2 (1 - |\Phi_a(z)|^2)^p dV(z) < \infty \right\}.$$

This is some kind of Bergman type space. We give several basic properties of $\mathcal{N}_p$ space and then the composition operators acting on this space will also be studied. The results are based on joint works with H.K.Le and T. Le.

Greg Knese, Washington University in St. Louis (geknese@math.wustl.edu)
Title: *Stable polynomials and boundary zeros*

Abstract: Polynomials with no zeros on a product of half-planes or a product of disks turn out to be natural objects in several areas of mathematics. In this talk we will focus on the properties of such polynomials when they have zeros on the boundary and the operator techniques used to unearth these properties. We will also discuss some related recent work on understanding and describing extreme points in the set of analytic functions on the polydisk with positive real part.

Ishwari Kunwar, Georgia Institute of Technology (ikunwar3@math.gatech.edu)
Title: *Multilinear dyadic operators and their commutators in the weighted setting*

Abstract: As in the bilinear case, m-linear dyadic paraproducts arise naturally in the decomposition of the pointwise product of m functions. I will present weighted estimates for the m-linear dyadic paraproducts and Haar multipliers, as well as their commutators with dyadic BMO functions.

Phi Le, University of Missouri-Columbia (llc33@mail.missouri.edu)
Title: *BMO solvability and absolute continuity of harmonic measure*

Abstract: We show that for a uniformly elliptic divergence form operator L, defined in an open set Ω with Ahlfors-David regular boundary, BMO-solvability implies scale invariant quantitative absolute continuity (the weak-A_∞ property) of elliptic-harmonic measure with respect to surface measure on $\partial\Omega$. We do not impose any connectivity hypothesis, qualitative or quantitative; in particular, we do not assume the Harnack Chain condition, even within individual connected components of Ω. In this generality, our results are new even for the Laplacian. Moreover, we obtain a converse, under the additional assumption that Ω satisfies an interior Corkscrew condition, in the special case that L is the Laplacian. This is a joint work with Steve Hofmann

Trieu Le, University of Toledo (trieu.le2@utoledo.edu)
Title: *Hilbert–Schmidt Hankel operators with conjugate holomorphic symbols*

Abstract: It is well known that a Hankel operator $H_{\bar{f}}$, where f is holomorphic, is Hilbert–Schmidt on the Bergman space over the unit disk if and only if f belongs to the Dirichlet space. On the other hand, it is also known that if $H_{\bar{f}}$ is Hilbert–Schmidt on the Bergman space over the unit ball in dimensions at least two, then f must be identically zero. This result has been generalized to strongly pseudoconvex domains and to certain classes of pseudoconvex domains. In this talk, I will show that the same result holds for arbitrary bounded complete Reinhardt domains in dimensions at least two.

Alan Legg, Purdue University (arlegg@purdue.edu)
Title: *The Bergman projection and polynomials on ellipsoids*

Abstract: By an argument reminiscent of a Fischer decomposition, and inspired by the fact that the solution operator of the Dirichlet problem for the Laplacian maps polynomials to harmonic polynomials on ellipsoids, we can show that the Bergman projection of an ellipsoid maps polynomials to holomorphic polynomials, even in several complex variables.

Constanze Liaw, Baylor University (Constanze-Liaw@baylor.edu)
Title: *Optimal approximants for the cyclicity problem in Dirichlet type spaces*

Abstract: We study the properties of the polynomials that minimize Dirichlet type norms $\|pf-1\|$ for a given function f. Connections with orthogonal functions and other fields arise. This is joint work with C. Bénéteau, D. Khavinson, D. Seco, and A. Sola.

Wenjing Liu, University of New Hampshire (wbs4@wildcats.unh.edu)
Title: *Commutative and noncommutative Beurling theorems*

Abstract: Yanni Chen extended the classical Beurling Theorem on the unit circle to the case where α is a continuous gauge norm on $L^\infty(\mathbb{T})$ such that $\alpha \geq \|\|_1$. Later Yanni Chen, Don Hadwin and Junhao Shen proved a noncommutative version of Beurling's theorem for a continuous unitarily invariant norm α on a tracial von Neumann algebra $(\mathcal{M},\tau)$ such that $\alpha \geq \|\|_{1,\tau}$ where the role of H^∞ is played by a maximal subdiagonal algebra $\mathcal{A}$. We first show that these results remain true under the weakened assumption that $\alpha \geq \varepsilon \|\|_1$ for some positive ε. We then show that if (Ω,μ) is a probability space and α is a normalized continuous gauge norm on $L^\infty(\mu)$ then there is a probability measure λ on Ω that is mutually absolutely continuous with respect to μ such that $\alpha \geq \varepsilon \|\|_{1,\lambda}$. The ε and λ are not unique. However, if there is an ε and λ so that $g = d\lambda/d\mu$ is log integrable, then Beurling's theorem holds for $L^\alpha(\mathbb{T})$. In the von Neumann algebra case we obtain a similar result in the von Neumann algebra case when the maximal subdiagonal algebra $\mathcal{A}$ contains the center of $\mathcal{M}$.

Doron Lubinsky, Georgia Institute of Technology (lubinsky@math.gatech.edu)
Title: *Quirky quadratures*

Abstract: The queen of quadratures is surely the familiar Gauss quadrature in the theory of orthogonal polynomials. These lead, via Poisson integrals, or Wendroff's theorem, to some quadrature formulae involving pairs of polynomials with interlacing zeros, and arbitrary integrable functions on the real line. There is a natural connection to sampling/quadrature involving de Branges spaces, and we consider this case too.
In a slightly different vein, though still with a Gauss flavor (is that a mixed metaphor?) we consider simultaneous quadrature coming from multiple orthogonal polynomials. Remarkably, potential theory plays a role even in the more convergence of the quadratures here. This second part is part of joint research under the tutelage of Walter Van Assche.

Erik Lundberg, Florida Atlantic University (elundber@fau.edu)
Title: *On the geometry of random lemniscates*

Abstract: A rational lemniscate is the level set of the modulus of a rational function. While sampling from an ensemble of random lemniscates that is invariant under rotations of the Riemann sphere, we study basic geometric and topological properties. For instance, what is the average (spherical) length of a random lemniscate and how much does it "wiggle"? How many connected components are there and what is their arrangement in the plane? We will make these questions precise and address each of them.

Paul McGuire, Bucknell University (pmcguire@bucknell.edu)
Title: *A class of hyponormal operators*

Abstract: This talk concerns joint work with Greg Adams and Nathan Feldman that focuses on the multiplication operator M_z on the reproducing kernel Hilbert space $H(K)$ of analytic functions with kernel

$$K(z,w) = \sum_{n=0}^{\infty} f(z)\overline{f(w)} \quad \text{where} \quad f(z) = (n+1)z^n + z^{n+1}.$$

The operator M_z has unit norm, spectrum the closed unit disk, an infinite rank self-commutator, and while hyponormal, is not subnormal. Additionally, M_z can be realized as the perturbation by a nice integral operator of a multiplication operator on the Hardy space. This results in a particularly appealing representation for the multiplication operators M_ϕ whose symbol ϕ is in the multiplier algebra of $H(K)$. One appeal of this particular operator is that it arises quite naturally on function spaces, does not appear to have been looked at previously, and is representative of a wide class of operators that arise in a similar fashion.

Shahaf Nitzan, Georgian Institute of Technology (shahaf.nitzan@math.gatech.edu)
Title: *Exponential systems over sets with finite measure*

Abstract: In many settings an orthogonal basis of a specific "simple structure" may not exist. For example, even the union of as few as two disjoint intervals may not admit an orthogonal basis of exponentials. In such cases one may consider systems which do not have as good properties as orthogonal bases but still preserve some of their qualities e.g. Riesz bases, frames, complete systems and others.
In this talk we will discuss the possibility of realizing such systems as systems of exponentials over sets of finite measure and review some recent results in this area. This talk is based on joint works with A. Olevskii, G. Kozma and A. Ulanovskii.

Benjamin Passer, Washington University in St. Louis (bpasser@math.wustl.edu)
Title: *C*-algebras with saturated actions*

Abstract: I will present extensions of the topological Borsuk-Ulam theorem to the world of C*-algebras. Roughly speaking, C*-algebras with saturated actions of finite groups have the following property: equivariant self-maps are homotopically nontrivial. This settles a recent conjecture of Ludwik Dabrowski and is related to other open problems.

James Pascoe, Washington University in St. Louis (pascoej@wustl.edu)
Title: *Matrix monotonicity in one and several variables*

Abstract: A real-valued function defined on a real interval is matrix monotone if $f(X) \leq f(Y)$ whenever $X \leq Y$ for any self-adjoint matrices X and Y whose spectra are in the its domain. In 1934, Charles Löwner showed that a real-valued function is matrix monotone if and only if it analytically continues to the upper half plane. Recently, with Ryan Tully-Doyle, we showed that Löwner's theorem holds in several noncommuting variables. We discuss our results, and methods of proof of Löwner's theorem in one variable which generalize to several variables.

Gabriel Prajitura, SUNY Brockport (gprajitu@brockport.edu)
Title: *Rhaly operators*

Abstract: Rhaly operators are one of the generalizations of the Cesaro operator. We will discus various properties of these operators on several spaces. This is joint work with George Popescu from Polytechnic University of Craiova, Romania

Koushik Ramachandran, Oklahoma State University (koushik.math@gmail.com)
Title: *Electrostatic skeletons*

Abstract: Let P be the equilibrium potential of a compact set K in R^n. An electrostatic skeleton of K is a positive measure whose support S has connected complement and empty interior, and the Newtonian (or logarithmic, when $n = 2$) potential is equal to P near infinity. We will prove the existence and uniqueness of an electrostatic skeleton for any simplex. This is based on joint work with Erik Lundberg.

Aaron Ernesto Ramirez Flores, Clemson University (aeramir@g.clemson.edu)
Title: *Density condition for sampling and interpolation in a framed Hilbert space*

Abstract: Starting with a generalized frame in a Hilbert space over a metric measure space, under certain assumptions we give necessary conditions in terms of densities for separated sequences to be sampling or interpolating.

Evguenii A. Rakhmanov, University of South Florida (rakhmano@math.usf.edu)
Title: *Characterization of Stahl compacta and a conjecture on the asymptotics of Hermite-Padé polynomials*

Abstract: The problem of asymptotics of Hermite-Padé polynomials is one of the hard contemporary open problems of complex analysis. This talk will outline a possible approach towards a resolution of this problem.

Trevor Richards, Washington and Lee University (richardst@wlu.edu)
Title: *Conformal modelling by polynomials*

Abstract: For a simply connected domain $D \subset \mathbb{C}$ and an analytic function $f : D \to \mathbb{C}$, we say that a polynomial p is a *conformal model* for f on D if there is an injective analytic map $\phi : D \to \mathbb{C}$ such that $f = p \circ \phi$ on D. Several proofs have been given in recent years that every such function f has a polynomial conformal model. We will review recent developments in the area, including a discussion of the minimum degree of the conformal model for a given function f and domain D.

Stefan Richter, University of Tennessee (richter@math.utk.edu)
Title: *Functions as quotients of multipliers*

Abstract: Alpay, Bolotnikov, and Kaptanoglu showed that every function in the Drury-Arveson space of the unit ball in $\mathbb{C}^d$ can be written as a quotient of two multipliers of the space. The result is based on a version of Leech's Theorem and it holds without change in proof for all spaces with normalized complete Nevanlinna-Pick kernel. We reprove this result for certain spaces including the Drury-Arveson and Dirichlet spaces. Our proof gives an explicit expression for the functions. Furthermore, we show that the result holds for functions in the weak products of these spaces, and we apply these results to obtain sufficient conditions for a function to be cyclic in the Drury-Arveson space. This is joint work with Alexandru Aleman.

Joel Rosenfeld, University of Florida (joelar@ufl.edu)
Title: *The Caputo fractional derivative and the Mittag-Leffler RKHS*

Abstract: I will present some historical background and motivation for fractional order differentiation. Following this, I will introduce a new RKHS, the Mittag-Leffler RKHS, for the purposes of estimating a function's Caputo fractional derivative and estimating the solutions of fractional order differential equations.

Benjamin Russo, University of Florida (russo5@ufl.edu)
Title: *Multivariate Lifting Theorems with an Application*

Abstract: An operator T on a Hilbert space H is called a *3-symmetric operator* if there exists operators $B_1(T^*, T)$ and $B_2(T^*, T)$ on H such that

$$Q_T(s) = e^{-isT^*}e^{isT} = I + sB_1(T^*, T) + s^2B_2(T^*, T)$$

for all $s \in \mathbb{R}$. A related class of operators, called *3-isometries*, have a similar definition. These operators have connections with Sturm-Liouville theory and are natural generalizations of self-adjoint and isometric operators. We call an operator J a *Jordan* operator of order 2 if $J = A + N$, where A is either unitary or self-adjoint, N is nilpotent of order 2, and A and N commute. As shown in the work of Agler, Ball and Helton, and joint work with McCullough, 3-symmetric and 3-isometric operators are modeled as the restriction of a Jordan operator to an invariant subspace. In this talk we discuss the extension of these theorems to the multi-variable case and an application to disconjugacy for Schödinger operators.

Brian Simanek, Baylor University (Brian-Simanek@baylor.edu)
Title: *Relative ratio asymptotics for general orthogonal polynomials*

Abstract: We will consider sequences of orthogonal polynomials with respect to a general class measures in the complex plane. In recent years, many tools have been developed to understand precisely when these polynomials exhibit ratio asymptotics. In this talk, we will consider a related phenomenon, namely relative ratio asymptotic behavior, which is a way of understanding ratio asymptotics from a perturbative point of view. After introducing some general results, we will pay specific attention to measures on the unit circle and discuss an application to random orthogonal polynomials on the unit circle.

Alan Sola, University of South Florida (sola@usf)
Title: *Cyclic polynomials in anisotropic Dirichlet spaces*

Abstract: We characterize the polynomials in two complex variables that are cyclic with respect to shift operators acting on weighted Dirichlet spaces on the bidisk. This reports on joint work with G. Knese, L. Kosinski, and T. Ransford.

Alex Stokolos, Georgia Southern University (astokolos@georgiasouthern.edu)
Title: *On chaos stabilization in nonlinear autonomous discrete dynamical systems*

Abstract: We propose an optimal average coefficients to stabilize equilibrium of nonlinear autonomous discrete dynamical systems. This is a joint talk with D.Dmitrishin and A.Khamitova.

James Sunkes, University of Tennessee (jsunkes@vols.utk.edu)
Title: *Hankel Operators, Invariant Subspaces, and Cyclic Vectors in the Drury-Arveson Space*

Abstract: In this talk, I will sketch the proof that every nonzero invariant subspace of the d-shift on the Drury-Arveson space H^2_d is an intersection of kernels of Hankel operators. I will then use this result to show that if f and $\frac{1}{f} \in H^2_d$, then f is cyclic in H^2_d. This talk is based upon a joint paper with my advisor, Stefan Richter, entitled "Hankel operators, invariant subspaces, and cyclic vectors in the Drury-Arveson space."

Edgar Tchoundja, Washington University in St. Louis (tchoundjaedgar@yahoo.fr)
Title: *Atomic decomposition and weak factorization for Bergman-Orlicz spaces*

Abstract: For $\mathbb{B}^n$ the unit ball of $\mathbb{C}^n$, we consider Bergman-Orlicz spaces of holomorphic functions in $L^\Phi_\alpha(\mathbb{B}^n)$, which are generalizations of classical Bergman spaces. We obtain their atomic decomposition and then prove weak factorization theorems involving the Bloch space and Bergman-Orlicz space and also weak factorization involving two Bergman-Orlicz spaces. This talk is based on joint work with D. Bekolle and A. Bonami.

Vilmos Totik, University of South Florida & University of Szeged (totik@mail.usf.edu)
Title: *Convexity of harmonic measures*

Abstract: Harmonic measures are fundamental in solving the Dirichlet problem and in estimating analytic functions, and equilibrium measures are special cases of them. It was proven by Benko, Dragnev and Totik that the density of the harmonic measure corresponding to a real point with respect to a domain $\mathbf{R} \setminus K$ ($K \subset \mathbf{R}$) is convex on any subinterval of K. The discrete analogue was proven in a work of Nagy and Totik. The talk will discuss harmonic measures, random walks, their discrete versions and some of their convexity properties..

Jinfeng Wei, Maryville University of St. Louis (jwei@maryville.edu)
Title: *Generalized extreme value theory and the limiting age of USA population*

Abstract: In this presentation, we introduce an analysis of generalized extreme value theory and its applications to USA advanced age mortality study. Our studied focuses on generalized Pareto extreme value theory, including the study of models, the estimation of parameters, and the asymptotic behavior. Applications of the extreme theory to the study of the limiting age of USA male and female populations are given.

Ruhan Zhao, SUNY Brockport (rzhao@brockport.edu)
Title: *Weighted BMO and Hankel operators between Bergman spaces*

Abstract: We introduce a family of weighted BMO spaces in the Bergman metric on the unit ball of $\mathbb{C}^n$ and use them to characterize complex functions f such that the big Hankel operators H_f and $H_{\bar{f}}$ are both bounded or compact from a weighted Bergman space into a weighted Lesbegue space with possibly different exponents and different weights. As a consequence, when the symbol function f is holomorphic, we characterize bounded and compact Hankel operators $H_{\bar{f}}$ between weighted Bergman spaces. This is a joint work with Jordi Pau and Kehe Zhu.

Lifang Zhou, Huzhou University (lfzhou@hutc.zj.cn)
Title: *Composition operators on harmonic function spaces*

Abstract: In this talk, the description of composition operators on harmonic function spaces is given. We will also discuss boundedness and norms of composition operators acting on harmonic Hardy spaces and harmonic Bergman spaces. This is a joint work with Congwen Liu and Taishun Liu.