Summer 2009

Thursday, May 21, 1:40-2:40 pm.

- Place: EMCS
- Speaker: George Androulakis, Department of Mathematics, University of South Carolina
- Title: The Invariant Subspace Problem
- Abstract: From linear algebra we know that every square matrix has complex eigenvalues. Thus for every *n* by *n*matrix there exists a subspace of dimension strictly between 0 and *n* which remains invariant under the action of the matrix. Is there an analogue for infinite matrices? This is the famous invariant subspace problem which remains open despite many efforts in the last 70 years.

Spring 2009

Tuesday, April 14, 3:00-4:00 pm.

- Place: EMCS 423
- Speaker: Ashok Krishnamurthy, Department of Bioinformatics and Biostatistics, School of Public Health and Information Sciences, University of Louisville, Louisville, KY, USA
- Title: An Iterative Phase I/II Clinical Trial Design Incorporating Genomic Biomarkers
- Abstract: The goal of a Phase I clinical trial is to determine the maximum tolerated dose (MTD) that corresponds to some given acceptable level of toxicity known as a dose-limiting toxicity. Effectiveness of the MTD is tested in a Phase II trial, where the purpose is to find the minimum effective dose (MED). Phase I designs are broadly classified into two categories based on their underlying philosophies: Nonparametric rule-based designs (ex: 3 + 3) and the Bayesian model-guided designs (ex: Continual Reassessment Method (CRM)). A well known limitation to the generalizability of Phase I clinical trials is the heterogeneity of the patient population. For example, cancer patients with intensive previous treatment are usually less tolerant of high doses and may be grouped accordingly. Ignoring the differences in groups and running a single Phase I clinical trial would result in an inaccurate estimate of the MTD. Patient-specific dosing adjusted for patient heterogeneity may be possible by incorporating information on patient characteristics or other measurable parameters. Particularly, genomic biomarkers can indicate disease susceptibility and be used for drug discovery and clinical trial patient stratification. We propose an iterative Phase I/II design that incorporates genomic biomarker information using high-dimensional microarray data to classify patients as biomarker positive (B+) or negative (B-). When heterogeneity is reflected in an observable pretreatment factor, patients can be stratified into groups in accordance with their biomarker status. We present and examine a method for obtaining separate MTD estimates for subgroups (B+/B-). Performance is evaluated by considering three MTD re-estimation techniques: the logistic regression, modified isotonic regression, and constrained logistic regression. The design then branches into a secondary Phase I trial for each of the two groups. We evaluate performance of the secondary phase I by considering: a modified traditional escalation rule and a Bayesian CRM design to obtain an MTD estimate for each subgroup separately.

Monday, April 13, 2:00-3:00 pm.

- Place: EMCS 218
- Speaker: Sumith Gunasekera, Department of Mathematical Sciences, University of Nevada - Las Vegas
- Title: Statistical Inferences for the Functions of Parameters of Several Pareto and Exponential Populations with the Applications in Data Traffic

- Abstract: The Pareto and exponential distributions are widely used to describe the distribution of positive random variables; in particular, they are used to model data relevant to social, scientific, geophysical, and many other types of observable phenomena. Furthermore, several Pareto and exponential populations, or the combination of several Pareto and exponential populations are widely used in Computer Networking and Data Transmission to model SelfSimilar (SS) or LongRangeDependent (LRD) network traffic that can be generated by multiplexing several Pareto and exponential distributed ON/OFF sources. One of the problems of interest in this presentation is statistical inferences concerning the common scale and common shape parameters of the several Pareto distributions, and common location and common shape parameters of several exponential distributions based on the generalized p-value approach introduced by Kam-Wah Tsui and Samaradasa Weerahandi where traditional frequentist or classical approaches do not provide useful solutions for the problems in the face of nuisance parameters. In this regard, we have developed exact tests and confidence intervals for the common scale and common shape Pareto parameters, and common location and common shape exponential parameters using the ideas of generalized p-values and confidence intervals. The resulting procedures are easy to compute and are applicable to small samples. We have also compared this test to a large sample test. Examples are given in order to illustrate results. In particular, using an example, it is pointed out that simply comparing the classical and generalized p-values can produce a different conclusion that the generalized pivotal quantities and confidence intervals have proved to be very useful tools for making inference in practical problems. Furthermore, Bayesian approach for the above problem is presented using Gibbs sampling technique when the shape parameters are unknown. Its outcomes are compared with other results based on classical and generalized approaches. The results based on the generalized variable method are utilized extensively in making inferences of complicated functions, especially Offered Optical Network Unit Load, of parameters of several Pareto and exponential populations that are found in Computer Networking and Data Transmission. Bayesian approach for the above problem is also discussed through a numerical approach. Examples are given through real data in order to illustrate our procedures. A limited simulation study is given to demonstrate the performance of the proposed procedures.

Fall 2008

Monday, November 10, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Gene Schlereth, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: The College Curriculum: Courses, Computers, and Changes
- Abstract: This talk will focus on a few current topics in the undergraduate curriculum. Specifically, I will report on the Course Redesign Workshop at the University of Mississippi and the efforts there to implement a required computer component in their lower level courses. I will also comment on the current state of affairs in the sophomore level differential equations course at many other institutions and compare these to our Math 245.

Monday, November 3, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Lucas van der Merwe and Marc Loizeaux, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: Edge Critical Graphs with Endvertices
- Abstract: We provide a sharp upper bound on the number of endvertices in edge critical graphs, and constructively establish the existence (with one exception) of edge critical graphs with k endvertices, where k is any integer less than this upper bound.

Monday, November 3, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Lucas van der Merwe and Marc Loizeaux, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: An Upper Bound On The Size of a 2-diameter Critical Graph
- Abstract: I will resent a problem that we are working on that was first introduced by Paul Erdos in the sixties. The discussion will be at a level that undergraduate students will understand.

Monday, October 13, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Meg Kiessling and Tracy Hughes, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: THEC ITQ GRANT: A to Ω
- Abstract: I will discuss the THEC Improving Teacher Quality Program from beginning to end. A discussion of the writing and submission process will be included, as well as the details for setting up and hosting a workshop on campus. Finally, I will discuss my conclusions and suggestions based on the experience of writing the proposal and hosting a summer workshop.

Monday, October 13, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Meg Kiessling and Tracy Hughes, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: EXPLORE-ing Middle School Mathematics
- Abstract: EXPLORE-ing Middle School Mathematics -- a THEC sponsored Improving Teacher Quality Workshop for Middle School Math Teachers: From concept to completion -- what was learned and what plans have developed for future workshops.

Monday, October 6, 4:00-5:00 pm.

- Place: EMCS 422
- Speaker: Lingju Kong, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Speaker: Qingkai Kong, Department of Mathematics, Northern Illinois University, DeKalb, Illinois, USA
- Title: On Nodal Solutions for Second Order Boundary Value Problems
- Abstract: We study the nonlinear boundary value problem (BVP) consisting of the equation: $$-(p(t)y')'+q(t)y= w(t)f(y),{\rm on}\;[a,b]$$ and a general separated boundary condition (BC). By comparing it with a linear Sturm-Liouville problem (SLP) we obtain conditions for the existence and nonexistence of nodal solutions of this problem. More specifically, let $\lambda_n, n=0,1,2,\dots$, be the n-th eigenvalue of the corresponding linear SLP. Then the BVP has a pair of solutions with exactly n zeros in (a,b) if λ_n is in the interior of the range of $f(y)/y$; and does not have any solution with exactly n zeros in (a,b) if λ_n is outside this range. These conditions become necessary and sufficient when $f(y)/y$ is monotone on $(-\infty, 0)$ and on $(0,\infty)$. We also discuss the changes of the number of different types of nodal solutions as the equation or the BC changes. Our results are obtained without assuming the global existence and uniqueness of solutions of the corresponding initial value problems. The proofs are mainly based on a bifurcation theorem by Rabinowitz and some recent results on the dependence of the eigenvalues of SLPs on the problems.

Monday, September 29, 4:00-4:50 pm.

- Place: EMCS 422
- Speaker: Boris Belinskiy, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: My High School Education: Some Thoughts about Two Different Teaching Philosophies
- Abstract: This is a story of my high school education at the fSU (former Soviet Union.) It is based on my own experience and does not lay claim to any generalization. My goal is to describe the mixture of the social, cultural, and political circumstances under which I was lucky to get, I think, a rather good high school education. I will try to describe both advantages and disadvantages of the fSU educational system in comparison with our system.

Monday, September 15, 4:00-4:50 pm.

- Place: EMCS 422
- Speaker: Francesco Barioli, Department of Mathematics, University of Tennessee at Chattanooga, Tennessee, USA
- Title: Minimum Rank for Symmetric Matrices with Qualitative Constraints
- Abstract: Over the last several years increasing attention has been paid to Inverse Eigenvalue Problems, mainly for the important applications to several fields, like Dynamical Systems, Image Reconstruction, Signal Reconstruction, and many others. In fact, an Inverse Eigenvalue Problem (IEP) consists on the reconstruction of a matrix from partial data, like eigenvalues and/or eigenvectors. Depending on the kind of information available (partial or complete, qualitative or quantitative) and depending on the constraints such a matrix is required to satisfy (nonnegativity, symmetry, zero/nonzero pattern), the solution of an IEP may be hard to obtain. As a matter of fact, for most IEPs a solution is far to be known. For a given class of matrices, a first step toward the solution of an IEP, is the determination of the minimum possible rank among all the matrices in that class. Of particular interest is the Minimum Rank Problem for a simple graph, namely, the minimum rank among real symmetric matrices whose zero-nonzero pattern of off-diagonal entries is described by a given simple graph G. The increasing interest in the problem has been brought to the attention of AIM (American Institute of Mathematics). In October 2006, an AIM workshop held in Palo Alto, CA, on Spectra of families of matrices, brought together people interested in Combinatorial Matrix Theory and Spectral Graph Theory. Since then, a group of 8-10 people, known as the AIM Minimum Rank Special Graphs Work Group is collaborating in a fruitful research. In this talk I will present most of this Work Group research. In particular, the Zero Forcing technique for the determination of the minimum rank of several classes of graphs, and results on several conjectures on minimum rank in terms of complements of graphs and dual graphs.

Friday, August 22, 2:00-2:50 pm.

- Place: EMCS 422
- Speaker: Linshan Wang, Department of Mathematics, Ocean University of China, Qingdao, P.R. China
- Title: Stability Analysis of Reaction-diffusion; Neural Networks with Delays
- Abstract: In this paper, we survey and utilize results from stability analysis of the reaction-diffusion equations with delays in order to develop a stable theory for the neural networks with delays.

Friday, August 22, 3:00-3:50 pm.

- Place: EMCS 422
- Speaker: Liping Wang, Department of Mathematics, Ocean University of China, Qingdao, P.R. China
- Title: Multivariate Compound Distribution and its Engineering Applications
- Abstract: Compound extreme value distribution (CEVD) was derived in 1980 as Poisson-Gumbel CEVD for typhoon induced extreme events in China Sea and Poisson-Weibull model for hurricane characteristics along Atlantic coasts and Gulf of Mexico at 1982. After their publication CEVD have aroused some interests of scientists and engineers. According to incomplete statistics for about forty coastal structures the CEVD was successfully used to predict design wave height. Especially, the catastrophe in New Orleans induced by Hurricane Katrina 2005 shows, that the design basis of New Orleans protection structures is ﷺStandard Project Hurricaneﷺ proposed by NOAA, which only corresponded to 38 years return period of hurricane central pressure and Hurricane Katrina corresponds to 60 years return period predicted by Poisson-Weibull model. Bivariate compound extreme value distribution was derived in different forms and applied in some engineering aspects, such as platform deck clearance design, disaster prevention design criteria for estuarine city Shanghai, coastal city Qingdao and et al. In this paper, the Poisson-Nested Logistic Trivariate Compound Extreme Value Distribution (PNLTCED) is derived by compounding the discrete distribution of number of data sampling over certain threshold level per year (Poisson distribution) into the multivariate continuous distribution (Nested logistic trivariate distribution). The distinguish of this model from our previous study lies in the data sampling of discrete distribution. In this paper, the number of data sampling over threshold level is taken account in the CEVD instead of typhoon occurrence frequency. Comparison between the predicted results based on the long term observed data and short term data shows its stability in prediction.