

AMS & SIAM UH CHAPTERS PRESENT

2018 Grad Student Presentations

Featuring the graduate students of the UH Department of Mathematics



APRIL 6, 2018 • PGH 232
LUNCH AT 12:30PM • TALKS BEGIN AT 1PM

We will have food and drinks from Luigi's
and a coffee break between sessions.

All are welcomed to attend.

Lunch/Introduction	12:30 - 1:00
Session 1	1:00 - 2:15
Coffee Break	2:15 - 2:25
Session 2	2:25 - 3:30
Judging	3:30 - 3:40
Winners Announced	3:40 - 3:50

Abstracts

German Tank Estimation and its application in the classification problem

Rasoul Hekmati

1:00pm

It is costly, time-consuming and hard to get new data for the scientific experiments. When it comes to the medical studies, It is even harder to find human subjects. So in most of the cases, we have to build our model (Classification for example) based on the restricted amount of the patients that we have. In this lecture, I explain German Tank Estimation and how it can help us to mitigate the data shortage problem. I explain how I used it in my own research on brain activity and how it helped me to build a more robust and trustful classifier to classify the epileptic patients with respect to their epileptic focus.

Impact of miRNA on cancer survival

Viktoria Muravina

1:15pm

MiRNAs are sets of 20-25 nucleotide-long non-coding RNAs that adjust gene expression. Each miRNA facilitates or impedes the expression of specific genes. There are several thousand of well identified miRNAs. Our goal is to identify miRNAs that have the most impact on cancer survival times.

Action of the free group on its boundary

Tattwamasi Amrutam

1:30pm

The free group on 2-generators acts on a compact Hausdorff space in a very natural way, and the action has certain properties. I use this example to motivate the definition of boundary action and talk about the role played by Boundary action in Group C^* -algebras.

Blood flow through arteries: Fluid-Structure Interaction approach

Prajakta Bedekar

1:45pm

I will talk about how to model blood flow through medium-to-large arteries using Navier-Stokes equations. Fluid flow causes wall movement and vice versa. We will see how this coupling is incorporated into the model. If time permits, we will see how some boundary conditions arise naturally out of the systems energy inequality. The talk will be preliminary. No previous knowledge of the subject will be assumed.

Making decisions in an uncertain world

Kate Nguyen

2:00pm

All animals make decisions by accumulating evidence in order to optimize their ability to succeed in their environment. Understanding the underlying mechanism behind these decisions has been a central feature of experimental and theoretical neuroscience in recent years. Drift diffusion models are commonly used to study this behavior because they are mathematically tractable, provide good description of a subjects behavior in a laboratory, and relate to the underlying neural activity. However, most mathematical studies of decision-making have focused on idealized situation, such as static environments or cases where subjects have no impact on the environment. In reality, the environment can be changed due to actions of living beings. We have extended the modeling framework to include spontaneous and action-induced environmental change. This more realistic model can help us understand the neural computations underlying decisions, and identify the biophysical mechanisms that make such computations possible.

Partial occlusion effects on AlexNet

Kazem Safari

2:15pm

The main goal was to study the effects of partial occlusion nuisance on test accuracy of an AlexNet trained on MNIST, a dataset of handwritten digits. A moving patch was used as the partial occlusion nuisance. For each digit, the most sensitive patch location was found and qualitative results were presented.

15 Minute Break

Quasi-static Dynamical Systems

Duong Nguyen

2:30pm

In this talk, I will introduce quasi-static dynamical systems (QDS), which is a generalization of the ordinary dynamical systems, and its connection to thermodynamics (although the scope of the QDS study is not limited to just thermodynamics). Some recent developments regarding ergodic theory and statistical properties of QDS will also be included.

A kinetic theory approach to pedestrian motion

Daewa Kim

2:45pm

In this talk, I would like to introduce the one mathematical model of pedestrian motion based on the statistical approach with the kinetic theory. The modeling approach considers dynamics caused by interactions of pedestrians not only with all the other pedestrians, but also with the geometry of the domain. There are four factors of interactions, which are the goal to reach the exit and the desire to avoid the collision with walls, and the tendency to look for less congested areas and to follow the stream unconsciously.

Well-posedness for weak solutions of axisymmetric div-curl systems

Juan Lopez

3:00pm

The div-curl system is a popular model in electromagnetics which asks to reconstruct a vector field with a prescribed divergence and curl. On bounded domains, the system may include normal or tangential boundary conditions. The domains topology may require extra conditions to be specified in order to guarantee the system has a unique solution. In this talk, I will describe well-posedness conditions for weak solutions of axisymmetric div-curl systems on bounded volumes of revolution with normal or tangential boundary conditions.

One-Bit Phase Retrieval

Dylan Domel-White

3:15pm

The phase retrieval problem tasks us with reconstructing signals based on intensity measurements. In the simple discrete case we model a "signal" by a vector x in a finite-dimensional Hilbert space H (real or complex), and model "intensity measurements" with the functions of the form $x \mapsto |f(x)|$ where f is a linear functional on H . After introducing the problem and discussing what is meant by "reconstruction", I will discuss a different measurement framework where even less information is retained from each measurement - just one bit.
