香港數學學會

The Hong Kong Mathematical Society

Contact address: Department of Mathematics Level 6, Academic 1 City University of Hong Kong Tat Chee Avenue Kowloon Tong Kowloon Hong Kong	Enquiries: 34428662 / 34428315 Fax: 34420250 Email: taoluo@cityu.edu.hk URL: http://www.hkms.org.hk

THE HONG KONG MATHEMATICAL SOCIETY
ANNUAL GENERAL MEETING 2017

20 May 2017 (Saturday)
9:30am- 5:15pm

Hong Kong University of Science and Technology

Schedule of Events

Venue: Lecture Theatre G (LTG), HKUST

9:30am -- 10:30am **HKMS Distinguished Lecture by Dave McLaughlin (Courant Institute)**

10:30am – 10:50am **Coffee Break**

10:50am – 11:40am **Plenary Lecture 1 by John Baez**
(University of California, Riverside)

11:40am – 12:00pm **Award Presentation Ceremony**

12:00am -- 12:15pm **HKMS Member's meeting**

12:15pm -- 2:00pm **Lunch (Chinese Restaurant)**

Venue: 2304 (lift 17-18), HKUST

2:00pm - 2:50pm **Plenary Lecture 2 by Dong Li**
(Hong Kong University of Science & Technology)

2:50pm – 3:15pm **Coffee Break**

Venue: 1504 (lift 25-26), 1505 (lift 25-26), 2303 (lift 17-18), 2304 (lift 17-18), HKUST

3:15pm – 5:15pm **Invited talks (Parallel Sessions)**

Title and Abstracts

Venue: Lecture Theatre G (LTG)
Distinguished lecture
Chair: Tong Yang

9:30am-10:30am: Dave McLaughlin (Courant Institute, Yew York University)
Title: Large-Scale Computational Modeling in Neural Science
Abstract: In this lecture, I will use our work in visual neural science to illustrate the potential that large-scale computational modeling presents to neural science today. Neural science is primarily an experimental science, with major advances following closely upon advances in experimental technology. Similarly, advances in computational technology over the past two decades have positioned computational scientists to contribute to the theoretical understanding of neuronal systems. For some time now, our group at NYU has been developing a large-scale computational representation of an input layer of the primary visual cortex (V1) of Macaque monkey – the "front end" of the monkey's visual system. Neurons in V1 are "edge detectors" -- detecting the orientation of edges within the visual scene. While monkey V1 is tiled by an ordered map of orientation preference, mouse V1 is tiled by a disordered "salt and pepper" map. In recent work, we have adapted our monkey V1 model to mouse V1, and have studied the differences in neuronal response in the presence, and the absence, of an ordered map of orientation preference. Very recent experiments on mouse V1 from the Scanziani and Tao labs have used opto-genetics techniques to observe for the first time "thalamus to cortical" excitation separately from "cortical to cortical" excitation. Our mouse model reproduces their laboratory observations, and allows us to analyze the mechanisms by which the model achieves the observed responses – with the disordered map of orientation preference.

Venue: LTG
Plenary lecture 1
Chair: Xiaoping Wang

10:50am – 11:40am: **John Baez (University of California, Riverside)**
Title: The dodecahedron and icosahedron
Abstract: The regular dodecahedron and icosahedron are not found in nature: they were discovered by Greek mathematicians, and we first read of them in a text written by Plato. Felix Klein used them to solve the quintic equation, and Vladimir Arnol'd showed they were hidden in the problem of wave propagation on a 2-dimensional region with boundary. They are also the first step to even more remarkable objects! For example, they can be used to construct the E8 lattice, which last year was proved to give the densest packing of spheres in 8 dimensions, and they can also be used to construct the Golay code, whose symmetry group is the Mathieu group M24, a finite simple group with 244823040 elements.

Venue: 2304 (lift 17-18)
Plenary lecture 2
Chair: Jun Zou

2:00pm – 2:50pm: **Dong Li (Hong Kong University of Science and Technology)**
Title: From Kato-Ponce to nonlocal fractional Leibniz
Abstract: In 1988 Kato and Ponce introduced a fundamental commutator estimate to settle well-posedness of Navier-Stokes and Euler equations in nearly optimal functional spaces. I will discuss a new unifying principle which includes the Kato-Ponce estimate and generalizes the fundamental Kenig-Ponce-Vega inequalities to optimal situations. I will mention a number of nontrivial applications in PDEs and several further refinements.

Venue: 2303 (lift 17-18)
Parallel Session 1: Financial Mathematics
Chair: Xianhua Peng

3:15pm – 3:45pm: Zuoquan Xu (Hong Kong Polytechnic University)
Title: Recent Advance of Mean-variance Models
Abstract: In this talk, we will address the mean-variance model with the mixed restriction of bankruptcy prohibition and convex cone portfolio constraints and the model with intractable claims. The talk is based on the joint works with Xun Li and Danlin Hou.

3:45pm – 4:15pm: Qingshuo Song (City University of Hong Kong)
Title: Solvability of Dirichlet Problem with Nonlinear Integro-differential Operator
Abstract: We will discuss the solvability of a class of Dirichlet problem associated with a non-linear integro-differential operator. The main ingredient is the use of Perron's method together with the probabilistic construction of continuous supersolution via the identification of the continuity set of the exit time operators in the path space under Skorohod topology.

4:15pm – 4:45pm: Xianhua Peng (Hong Kong University of Science and Technology)
Title: EM Algorithm and Stochastic Control
Abstract: Generalizing the idea of the classical EM algorithm that is widely used for computing maximum likelihood estimates, we propose an EM-Control (EM-C) algorithm for solving multi-period finite time horizon stochastic control problems. The new algorithm sequentially updates the control policies in each time period using Monte Carlo simulation in a forward-backward manner; in other words, the algorithm goes forward in simulation and backward in optimization in each iteration. Similar to the EM algorithm, the EM-C algorithm has the monotonicity of performance improvement in each iteration, leading to good convergence properties. We demonstrate the effectiveness of the algorithm by solving stochastic control problems in the monopoly pricing of perishable assets and in the study of real business cycle.

Venue: 1504 (lift 25-26)
Parallel Session 2: Partial Differential Equations
Chair: Xianpeng Hu

3:15pm – 3:45pm: Renjun Duan (The Chinese University of Hong Kong)
Title: Global well-posedness for the Boltzmann equation
Abstract: The talk is concerned with the nonlinear Boltzmann equation in the spatially inhomogeneous case. I will first survey the mathematical results on the global well-posedness and large-time behavior of solutions to the initial and/or boundary value problem in different settings, and then present our recent work on global well-posedness for initial data of large amplitude. Some further possible development of global well-posedness for the Boltzmann equation will also be discussed in the end.

3:45pm – 4:15pm: Tianling Jin (Hong Kong University of Science and Technology)
Title: On the best constants of fractional Sobolev inequalities in domains
Abstract: We study the best constants of fractional Sobolev inequalities in domains. We show that these optimal constants depend on the domains, and can be achieved in many cases, which is different from the classical Sobolev inequalities in domains.

4:15pm – 4:45pm: Yong Yu (The Chinese University of Hong Kong)
Title: Conically singular solution in semilinear elliptic equations
Abstract: in this talk we will firstly introduce the conically singular solution in the prescribed Gaussian curvature problem. Then I will introduce a new Born-Infeld approximation scheme to re-prove this classical result. This method will finally be generalized to a class of semilinear elliptic equations with exponential nonlinearities, in which Chern-Simons-Higgs equation and gauged harmonic map equation are included. New conically singular solutions are found in these two physical models.

4:45pm – 5:15pm: Yongli Cai (Huaiyin Normal University)
Title: Bifurcation branch in a spatial heterogeneous epidemic model with cross-diffusion
Abstract: In this talk, we consider the strongly coupled epidemic model in a spatially heterogeneous environment with Neumann boundary condition. We show that the model admits a bounded branch Γ of positive solutions, which is a monotone $\mathbf{S}$--type or fish-hook shaped curve with respect to the bifurcation parameter δ. One of the most interesting findings is that the multiple endemic states are induced by the cross-diffusion and the spatial heterogeneity of environments together.

Venue: 1505 (lift 25-26)
Parallel Session 3: Recent progress in inverse problems
Chair: Hai Zhang

3:15pm – 3:45pm: Eemeli Blasten (Institute for Advanced Study, HKUST)
Title: Transmission eigenfunction localization
Abstract: Potentials of the Helmholtz or Schrodinger operators which have a corner jump enjoy an interesting property in fixed frequency scattering: all non-trivial incident waves scatter, i.e. the object is never 100 percents transparent to any wave. In a recent work with Hongyu Liu we quantify this result. This implies that transmission eigenfunctions vanish at

corners in certain situations. I will start with a short history of the interior transmission problem, how it relates to corner scattering, and then present recent results.

3:45pm – 4:15pm: Yuliang Wang (Hong Kong Baptist University)
Title: Electromagnetic interior transmission eigenvalue problem for inhomogeneous media containing obstacles and its applications to near cloaking
Abstract: This talk is concerned with the invisibility cloaking in electromagnetic wave scattering from a new perspective. We are especially interested in achieving the invisibility cloaking by completely regular and isotropic mediums. Our study is based on an interior transmission eigenvalue problem. We propose a cloaking scheme that takes a three-layer structure including a cloaked region, a lossy layer and a cloaking shell. The target medium in the cloaked region can be arbitrary but regular, whereas the mediums in the lossy layer and the cloaking shell are both regular and isotropic. We establish that there exists an infinite set of incident waves such that the cloaking device is nearly-invisible under the corresponding wave interrogation. The set of waves is generated from the Maxwell-Herglotz approximation of the associated interior transmission eigenfunctions. We provide the mathematical design of the cloaking device and sharply quantify the cloaking performance.

4:15pm – 4:45pm: Yi-Hsuan Lin (Institute for Advanced Study, HKUST)
Title: Nearly cloaking for the elasticity system with residual stress
Abstract: This work extends the study of the nearly cloaking scheme to the elasticity system with residual stress in two or three dimensional spaces, which is an anisotropic elasticity system. It is worth to mention that there are no minor symmetric properties for the elastic tensor with residual stress and this system is invariant under a coordinate transformation. Therefore, we think the elasticity system residual stress model is more natural than the isotropic elasticity system in designing the elastic cloaking medium in the physical sense. In addition, the main difficulty of treating this problem lies in the fact that there are no layer potential theory for the residual stress system. Instead, we will derive suitable elliptic estimates for the elasticity system residual stress by comparing with the Lamé system to achieve desired results.

4:45pm – 5:15pm: Hongjie Li (Hong Kong Baptist University)
Title: On anomalous localized resonance for the elastostatic system
Abstract: In this talk, I will talk about our recent results on anomalous localized resonances (ALR) due to a plasmonic structure for the elastostatic system in two and three dimensions. I shall first talk about our study from a variational perspective. Then, I will discuss the ALR from a spectral perspective. Since the Neumann-Poincare(N-P) operator for the Lame system is not compact even if the domain has a smooth boundary, the main difficulty is to calculate the spectrum of that operator. Using the spectrum of N-P operator, the occurrence and non-occurrence of ALR will be discussed in three dimensions.

Venue: 2304 (lift 17-18)

Parallel Session 4: Recent advances in scientific computing and applications

Chair: Eric Chung and Ronald Lui

3:15pm – 3:45pm: Shun Zhang (City University of Hong Kong)

Title: A Posteriori Error Estimators Based on Primal-Dual Variational Formulations

Abstract: Recently, based on the Prage-Synge identity, a posteriori error estimator for finite element approximations to the diffusion equation has been developed with the reliability constant to be one. In this talk, I will talk about its generalization: error estimators based on the gap between approximations of primal and dual problems and the localization of these estimators.

3:45pm – 4:15pm: Zhiwen Zhang (University of Hong Kong)

Title: Multiscale tailored finite point method for second order elliptic equations with rough or highly oscillatory coefficients

Abstract: We develop a multiscale tailored finite point method (MsTFPM) for second order elliptic equations with rough or highly oscillatory coefficients. The finite point method has been tailored to some particular properties of the problem so that it can capture the multiscale solutions using coarse meshes without resolving the fine scale structure of the solution. Several numerical examples in one- and two-dimensions are provided to show the accuracy and convergence of the proposed method. In addition, some analysis results based on the maximum principle for the one-dimensional problem are proved.

4:15pm – 4:45pm: Wing-Cheong Lo (City University of Hong Kong)

Title: Modeling of Budding Yeast: from Single Cell to Population Development

Abstract: Robust cell polarity is critical for cell survival and normal tissue development. Cell polarity is usually induced through the localization of specific molecules to a proper location of the cell membrane. Here we discuss several models consisting the particle density of membrane bound molecules undergoing polarization to study the mechanisms for different budding patterns in yeast cells. Also, we are developing a yeast cell population model to study how budding patterns are involved in cell population dynamics. Overall, our results provide a foundation to develop a multi-scale model for describing the collective behaviour of aging budding yeast cells.

4:45pm – 5:15pm: Jie Du (The Chinese University of Hong Kong)

Title: A high order method for solving conservation laws on arbitrarily distributed point clouds

Abstract: In this talk, we aim to solve the hyperbolic conservation laws on arbitrarily distributed point clouds. The initial condition is given on such a point cloud, and the algorithm solves for point values of the solution at later time also on this point cloud. By using the Voronoi technique and by introducing a grouping algorithm, we divide the computational domain into non-overlapping cells. Each cell is a polygon and contains a minimum number of the given points to ensure accuracy. By adapting the traditional discontinuous Galerkin method on the constructed polygonal mesh, we obtain a stable, conservative and high order method.


香港科技大学 (HKUST) Campus Map
North Entrance
北門入口
North Bus Station
北門巴士站
Car Park
停車場
B1
S H Ho Sports Hall
何善衡體育館
Ping Yuan and Kinmay W Tang Gallery
唐炳源、唐溫金美展覽廳
Chevalier Learning Commons
貴士綜合研習坊
SQ Towers 5-7
教職員宿舍五至七座
Hall III
學生宿舍
PG Hall II
研究生宿舍二座
Stephen Kam Chuen Cheong Ha
張鑑泉樓
Lee Shau Kee Library
李兆基圖書館
Tsang Shiu Tim Art Hall
曾肇添展藝廊
Bank
銀行
Bookstore
大學書店
Security Center
保安中心
Piazza
廣場
Mr and Mrs Ho Ting Sik Visitor Information Center
何廷錫伉儷訪客資訊中心
The Hong Kong Jockey Club Atrium
香港賽馬會大堂
Souvenir Center
紀念品中心
Banks
銀行
Escalators
自動電梯
2304
2303
Bridge Link
連接橋
Amphitheater
圓形露天劇場
Hall I
學生宿舍一座
Chinese Restaurant
A1
A2
B
C
D
E
F
G
H
J
K
Chia-Wei Woo Academic Concourse
吳家瑋學術廊
1505
1504
B3
B2
Coffee Shop
Lecture Theater G (LTG)
UniLodge (South Block)
水雲軒（南座）
Tin Ka Ping Hall
田家炳廳
Lo Ka Chung University Ce
盧家聰大學中心
Towers C & D
C及D座
Tower B
B座
Staff Quarters T
教職員宿舍八
The Hong Kong Jockey Club Biotechnology Research Institute
香港賽馬會生物技術研究所
The Hong Kong Jockey Club Enterprise Center
香港賽馬會創新科技中心
Cheng Yu Tung Building
鄭裕彤樓
Courts A, B, C
CLP Substation
Tower A
A座
Wong Check She Research Center for Environment and Infrastructure
黃焯書科研中心
CLP Power Wind/Wave Tunnel Facility
中電風浪實驗所
Geotechnical Centrifuge Facility
岩土工程離心機實驗所
Hourly Car Park
時租停車場
Lee Shau Kee Business Building
李兆基商學大樓
South Bus Station
南門巴士站
South Entrance
南門入口
Water Bay
Ngan Ying Road
* LTG, 1504, 1505 are near coffee shop on the first floor.
* Take Lift 17-18 for 2303, 2304 on second floor