南 方 科 技 大 学

1st East Asia Symposium of IPIA

Programme

South University of Science and Technology, Shenzhen, China

Feb. 29-Mar. 1, 2016

Venue: *Room 706, Service Center for Teaching and Research*（教学科研服务中心 706 会议室）

Organizing Committee:

Jingzhi Li, South University of Science and Technology

Hongyu Liu, Hong Kong Baptist University

Gunther Uhlmann, University of Washington, Seattle & Hong Kong University of Science and Technology

Jenn-Nan Wang, National Taiwan University

Bo Zhang, Institute of Applied Math, Chinese Academy of Sciences

Jun Zou, Chinese University of Hong Kong

Contact: *Airong Liu*（刘爱容） *18929302017* *liuar@sustc.edu.cn*

Zhenyu Wen（温珍玉） *18824292012* *wenzy@mail.sustc.edu.cn*

Day 1: Sunday, February 28, 2016	
12:00-24:00	**Hotel Check-in**：**Guest House 1**（专家公寓 1 栋）
17：30-19:00	**Dinner at Faculty Restaurant**（教工餐厅）
Day 2: Monday, February 29, 2016	
08:30-09:00	**Check in for the Meeting** （Room 706）
09:00-09:20	**Opening Remark and Photo Taking**
Session 1 **Chair**：**Bo Zhang**	

09:20-10:10	**Xiaofei Li,** Inha University, Korea *Matched asymptotic analysis to solve the narrow escape problem in a domain with a long neck*
10:10-10:30	**Tea Break** （Room 703）
10:30-11:20	**Yi-Hsuan Lin,** National Taiwan University *The enclosure method for the anisotropic Maxwell system*
11:20-12:10	**Catalin Carstea,** National Taiwan University *Uniqueness for the two dimensional Calderon problem with singular conductivity*
12:30-14:00	**Lunch at Faculty Restaurant（教工餐厅）**
Session 2	**Chair：Gunther Uhlmann**
14:00-14:50	**Yuliang Wang,** Hong Kong Baptist University *A Gesture-based Instruction and Input Device Using Acoustic Waves*
14:50-15:40	**Eemeli Blasten,** Hong Kong University of Science and Technology *Non-scattering energies, new resolvent estimates and other projects*
15:40—16:00	**Tea Break**
16:00-17:00	**Haizhang Zhang,** Sun Yat-sen University *Hyper-Gaussian regularized Whittaker-Kotel'nikov-Shannon sampling series*
17:30-20:00	**Banquet at Faculty Restaurant（教工餐厅）**
Day 3: Tuesday, March 1, 2016	
Session 3	**Chair：Jingzhi Li**
09:00-9:50	**Jiaqing Yang**, Xi'an Jiaotong University *Determination of coefficients in Helmholtz equations for periodic structures*
9:50-10:10	**Tea Break** （Room 703）
10:10-11:00	**Qi Ye,** South China Normal University, Guangzhou *Kernel-based Methods for Deterministic or Stochastic Data*

11:00-11:50	**Jian Lu**, Shenzhen University, Shenzhen *An exp-model and its fixed-point proximity algorithm for multiplicative noise removal*
12:00-14:00	**Lunch at Faculty Restaurant（教工餐厅）**
Departure	

Participants

Eemeli Blasten, Hong Kong University of Science and Technology

Catalin Carstea, National Taiwan University

Eric Chung, The Chinese University of Hong Kong

Kazufumi Ito, North Carolina State University

Junjiang Lai, Minjiang University

Hongjie Li, Beijing Institute of Technology

Jingzhi Li, Southern University of Science and Technology

Xiaofei Li, Inha University

Yi-Hsuan Lin, National Taiwan University

Leevan Ling, Hong Kong Baptist University

Hongyu Liu, Hong Kong Baptist University

Wenting Long, Sun Yat-sen University

Jian Lu, Shenzhen University

Gunther Uhlmann, Hong Kong University of Science and Technology & University of Washington, Seattle

Yuliang Wang, Hong Kong Baptist University

Zhifeng Wu, Sun Yat-sen University

Jingni Xiao, Hong Kong Baptist University

Boxi Xu, Hong Kong University of Science and Technology

Yifeng Xu, Shanghai Normal University

Yuesheng Xu, Sun Yat-sen University

Jiaqing Yang, Xi'an Jiaotong University

Qi Ye, South China Normal University

Bo Zhang, Chinese Academy of Sciences

Hai Zhang, Hong Kong University of Science and Technology

Haiwen Zhang, Chinese Academy of Sciences

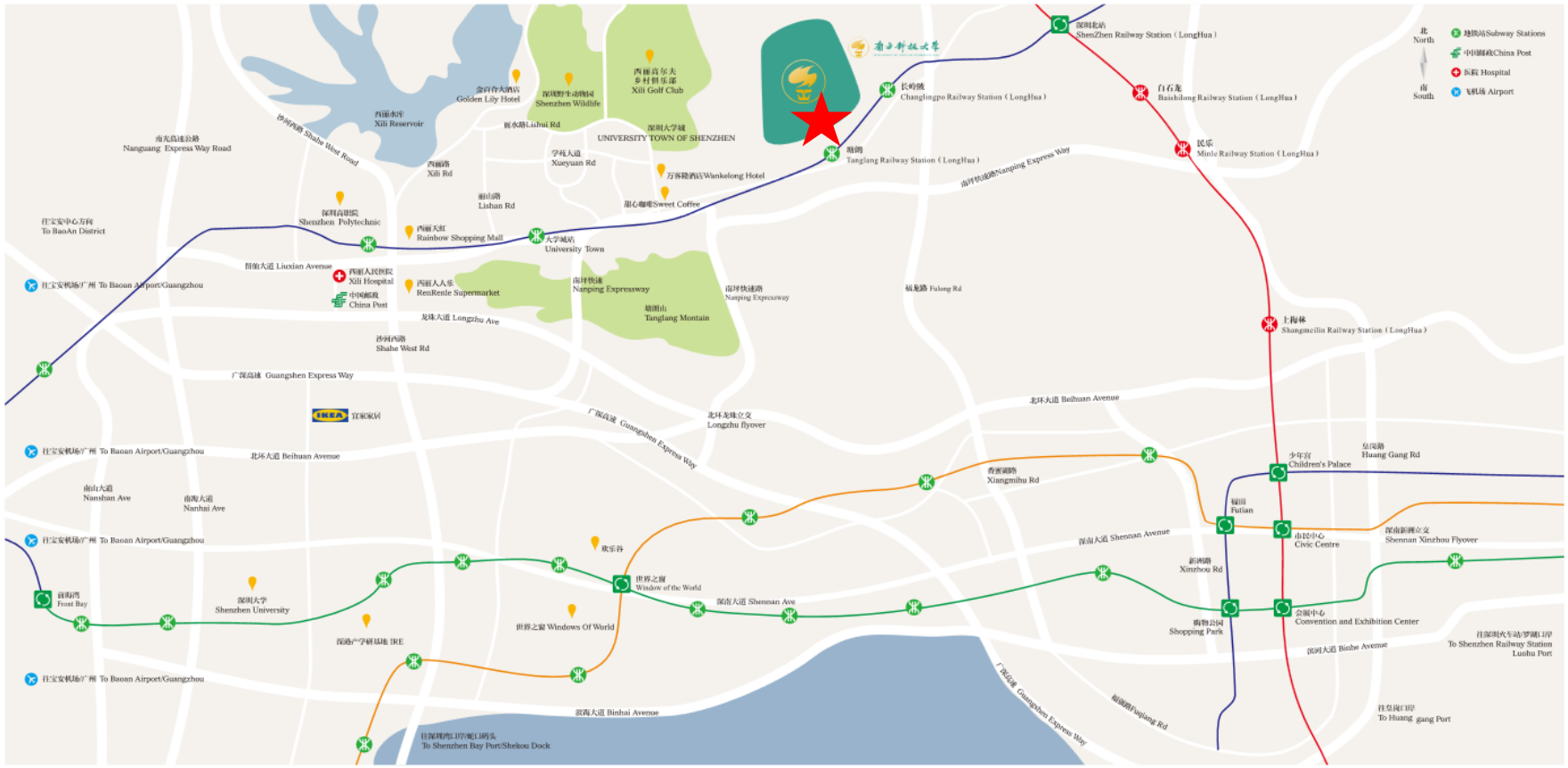
Haizhang Zhang, Sun Yat-sen University

Shuhui Zhong, Tianjin University

Jun Zou, The Chinese University of Hong Kong

Traffic Information

By Metro: **Tanglang Station（塘朗站）**, **Huanzhong Line**; ***School gate 1（一号门）*** is 500m from **Exit C** of Tanglang Metro Station
By Bus: SUSTC Station（南方科技大学站）, Line M369, 43, 74, 81
Taxi: Southern University of Science and Technology in Tanglang（塘朗）, Nanshan District
Address: No 1088, Xueyuan Rd., Xili, Nanshan District, Shenzhen, Guangdong, China 518055



Campus Map

Hotel Information and Check-in

- Guest House 1（专家公寓 1）
- Front Desk Telephone：86-0755-88015773
- Show your ID card or passport for hotel check-in

Abstracts

1. Eemeli Blasten, Hong Kong University of Science and Technology

Title: ***Non-scattering energies, new resolvent estimates and other projects***

Abstract: I will introduce myself and talk about most of my past and present work in a non-technical way. My previous work was on three topics: the 2D inverse problem for the Schrödinger equation, transmission eigenvalues and non-scattering energies. Presently I'm working on several projects:

- proving Green's function estimates for general constant coefficient PDEs
- non-scattering energies in the hyperbolic space
- understanding the solution to inverse backscattering by Rakesh and Uhlmann
- 1D networked inverse problem for water pipe systems (with real engineers!)
- making LaTeX-quality documents for the web

The talk will mostly focus on the mathematics related to scattering theory and less on the last two topics.

2. Catalin Carstea, National Taiwan University

Title: ***Uniqueness for the two dimensional Calderon problem with singular conductivity***

Abstract: In this talk I will discuss the uniqueness question for Calderon's problem in two dimensions for conductivities in W^{1,2} whose Sobolev norm is small. Even with the smallness condition this allows for unbounded conductivities.

3. Xiaofei Li, Inha University, Korea

Title: ***Matched asymptotic analysis to solve the narrow escape problem in a domain with a long neck***

Abstract: In this study, we mainly consider the narrow escape problem in a two-dimensional domain Ω with a long neck, which is the two-dimensional analogue of a dendritic spine geometry. The narrow escape problem requires the computation of the mean escape time of a Brownian particle starting from the head until it exits from the end of the neck, where the particle is absorbed. We divide the domain into the neck part Ω_n and the head part Ω_h, with the common boundary Γ_{ε}. The escape time in Ω_h can be considered to be the time from the head to the end of the neck, while the escape time in Ω_n can be considered to be the time from the neck to the end of the neck. We compute the two exit times separately and match them by considering some boundary value problem with an impedance boundary condition on Γ_{ε}, which we refer to as the Neumann-Robin boundary model.

4. Yi-Hsuan Lin, National Taiwan University

Title: ***The enclosure method for the anisotropic Maxwell system***

Abstract: We develop an enclosure-type reconstruction scheme to identify penetrable and impenetrable obstacles in electromagnetic field with anisotropic medium in \mathbb{R}^{3}. The main difficulty in treating this problem lies in the fact that there are so far no complex geometrical optics solutions available for the Maxwell's equation with anisotropic

medium in \mathbb{R}^{3}. Instead, we derive and use another type of special solutions called oscillating-decaying solutions. To justify this scheme, we use Meyers' L^{p} estimate, for the Maxwell system, to compare the integrals coming from oscillating-decaying solutions and those from the reflected solutions.

5. Jian Lu, Shenzhen University, Shenzhen

Title: ***An exp-model and its fixed-point proximity algorithm for multiplicative noise removal***

Abstract: We propose a variational model for restoration of images corrupted by multiplicative noise. The proposed model formulated in the logarithm transform domain of the desirable images consists of a data fitting term, a quadratic term, and a total variation regularizer. The data fitting term results directly from the presence of the multiplicative noise and the quadratic term reflects the statistics of the noise. We show that the proposed model is strictly convex under a mild condition. The solution of the model is then characterized in terms of the fixed-point of a nonlinear map described by the proximity operator of a function involved in the model. Based on the characterization, we present a fixed-point proximity algorithm for solving the model and analyze its convergence. Our numerical results indicate that the proposed model compares favorably to several existing state-of-the-art models with better results in terms of the peak signal-to-noise ratio of the denoised images and the CPU time consumed.

6. Yuliang Wang, Hong Kong Baptist University

Title: ***A Gesture-based Instruction and Input Device Using Acoustic Waves***

Abstract: A novel method is proposed for the recognition of gestures

using acoustic waves. The gestures are modeled by acoustic scatterers whose shapes are drawn from a prescribed dictionary and the recoginition is modeled as an inverse acoustic scattering problem. The incident wave is generated from a fixed point exterior of the scatterer and the scattered field is measured at a bounded surface containing the source point. The recognition algorithm consists of two steps and requires two incident wave of different wavenumber. The approximate location of the scatterer is firstly determined by using the measured data at small wavenumber and the shape of the scatterer is then identified using the computed location of the scatterer and the measured data at a regular wavenumber. Numerical experiments show the proposed method is computationally efficient and works with full or phaseless backscattering data of small aperture.

7. Jiaqing Yang, Xi'an Jiaotong University, Xi'an

Title: ***Determination of coefficients in Helmholtz equations for periodic structures***

Abstract: In this talk, I will discuss an inverse problem of determining the coefficient for the Helmholtz equation from the near-field data in the periodic case. I will show under some certain conditions that the index of refraction or at least its support in a multi-layered media is completely recovered, using partial scattering field data measured only from one side of the total structure, corresponding to a countably infinite number of downward propagating incident plane waves.

8. Qi YE, South China Normal University, Guangzhou

Title: ***Kernel-based Methods for Deterministic or Stochastic Data***

Abstract: This talk gives a new insight of kernel-based methods to solve the deterministic or stochastic problems such as (stochastic) partial

differential equations. We will combine the techniques of meshfree approximation and kriging interpolation to restudy the kernel-based methods for the scattered data approximation. Generally, we will combine the knowledge of approximation theory, statistical learning, probability theory, and stochastic analysis into one theoretical structure. The main idea is to endow the Sobolev spaces with the probability measures induced by the positive definite kernels such that the Gaussian random variables can be well-defined on the Sobolev spaces. The constructions of these Gaussian random variables will provide the kernel-based estimators for the deterministic or stochastic data.

This work is joint with Leevan Ling at HKBU.

9. Haizhang Zhang, Sun Yat-sen University, Guangzhou

Title: ***Hyper-Gaussian Regularized Whittaker-Kotel'nikov-Shannon Sampling Series***

Abstract: The reconstruction of a bandlimit function from its finite sample data is fundamental in signal analysis. It is well-known that oversampling of a bandlimited function leads to linear convergence in its reconstruction. A simple and efficient Gaussian regularized Shannon sampling formula has been proposed with such a linear convergence ability. We show that all hyper-Gaussian regularized formula share this desired property. The analysis is built on estimates on the Fourier transform of the hyper-Gaussian functions.

This work is joint with Yang Wang at HKUST.