香港城市大學
City University of Hong Kong

LIU BIE JU CENTRE FOR MATHEMATICAL SCIENCES

DEPARTMENT OF MATHEMATICS
數 學 系

Workshop on

Recent Advances in Finite Element Methods 2017

13 - 15 March 2017

City University of Hong Kong

Workshop on

Recent Advances in Finite Element Methods 2017

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Objective

The workshop will provide a platform for academic exchange and in-depth discussion on the following topics:

- Adaptivity
- High wave number problems
- Fully nonlinear problems
- DG and non-conforming methods

Plenary Speakers

Zhiqiang Cai, Purdue University, USA
Bernardo Cockburn, University of Minnesota, USA
Alexandre Ern, University of Paris-Est, France
Xiaobing Feng, The University of Tennessee, USA
Jichun Li, University of Nevada, USA

Organizing Committee

Weifeng Qiu, City University of Hong Kong (co-chair)
Shun Zhang, City University of Hong Kong (co-chair)

Venue:

Conference Room 1,
Block 1, To Yuen Building,
City University of Hong Kong,
31 To Yuen Street,
Kowloon Tong,
Hong Kong

Enquiries:

Liu Bie Ju Centre for
Mathematical Sciences
City University of Hong Kong

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Recent Advances in Finite Element Methods 2017
Workshop Schedule
(March 13-15, 2017)

Time	March 13 (Mon)	March 14 (Tue)	March 15 (Web)
08:50 - 09:00	**Registration**		
09:00 - 09:05	**Opening Speech**		
	Chairman: Shun ZHANG	**Chairman: Shun ZHANG**	**Chairman: Frederick W. F. QIU**
09:10 - 10:00	**Alexandre ERN**	**Zhiqiang CAI**	**Xiaobing FENG**
10:00 - 10:30	**Frederick W. F. QIU**	**Yanqiu WANG**	**Haijun WU**
10:30 - 11:00	Coffee Break	Coffee Break	**Yinhua XIA**
11:00 - 11:30	**Ke SHI**	**Kwang-Yeon KIM**	Coffee Break
11:30 - 12:00	**Issei OIKAWA**	**Wenbin CHEN**	**Eric CHUNG**
12:00 - 12:30	Lunch Break	Lunch Break	**Zhiwen ZHANG**
12:30 - 14:00			
	Chairman: Frederick W. F. QIU	**Chairman: Frederick W. F. QIU**	
14:00 - 15:00	**Bernardo COCKBURN**	**JiChun LI**	
15:00 - 15:30	**Yan XU**	**Huadong GAO**	
15:30 - 16:00	**Bo DONG**	**Buyang LI**	
16:00 - 16:30	Coffee Break	Coffee Break	
16:30 - 18:30			
18:30 - 21:00		**Banquet**	

Remarks:

Workshop Venue: Conference Room 1, Block 1, To Yuen Building, City University of Hong Kong, 31 To Yuen Street, Kowloon Tong, Hong Kong.
(九龍塘桃源街31號, 香港城市大學, 桃源樓, 一號會議室)

Banquet Venue: Staff Lounge, City Top Restaurant, 9/F, City University Amenities Building
(香港城市大學, 康樂樓九樓, 城峰閣)

A Posteriori Error Estimators for Discontinuous Finite Element Approximations to Diffusion Problems

Zhiqiang Cai
Department of Mathematics, Purdue University, USA
Email: caiz@purdue.edu

In this talk, we will describe both residual and equilibrated a posteriori error estimators for the nonconforming and the discontinuous Galerkin finite element approximations to diffusion problems. It is shown that both the residual and the equilibrated a posteriori error estimators are robust with respect to the diffusion coefficient, i.e., constants in the error bounds are independent of the jump of the diffusion coefficient. Moreover, we obtained some of those estimates with no assumption on the distribution of the diffusion coefficient.

(Joint work with Daozhi Han and Xiaoming Wang)

Uniquely solvable and energy stable decoupled numerical schemes for the Cahn-Hilliard-Stokes-Darcy system for two-phase flows in karstic geometry

Wenbin Chen
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We propose and analyze two novel decoupled numerical schemes for solving the Cahn-Hilliard-Stokes-Darcy (CHSD) model for two-phase flows in karstic geometry. In the first numerical scheme, we explore a fractional step method (operator splitting) to decouple the phase-field (Cahn-Hilliard equation) from the velocity field (Stokes-Darcy fluid equations). To further decouple the Stokes-Darcy system, we introduce a first order pressure stabilization term in the Darcy solver in the second numerical scheme so that the Stokes system is decoupled from the Darcy system and hence the CHSD system can be solved in a fully decoupled manner. We show that both decoupled numerical schemes are uniquely solvable and energy stable. Ample numerical results are presented to demonstrate the accuracy and efficiency of our schemes.

A staggered hybridization technique for elastic wave propagation

Eric Chung
Department of Mathematics, The Chinese University of Hong Kong, Hong Kong
Email: tschung@math.cuhk.edu.hk

In this talk, we present a class of discontinuous Galerkin methods for elastic wave propagation. The main feature of the scheme is a hybridization in a staggered manner. The method has several advantages including energy conservation, explicit, high order optimal convergence. Moreover, we will show that the dispersion error has a super convergence property. We will present both numerical examples and convergence analysis. This work is partially supported by Hong Kong RGC General Research Fund (Project: 400813).

A note on the Monge-Ampère type equations with general source terms

Weifeng Qiu
Department of Mathematics, City University of Hong Kong, Hong Kong
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In this paper we consider the generalised solutions to the Monge-Ampère type equations with general source terms. We firstly prove the so-called comparison principle and then give some important propositions for the border of generalised solutions. Furthermore, we design well-posed finite element methods for the generalised solutions with the classical and weak Dirichlet boundary conditions respectively.

(Joint work with Lan Tang)

Static condensation, hybridization, and the devising of the HDG methods

Bernardo Cockburn
School of Mathematics, University of Minnesota, USA
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We review the main ideas for devising the so-called hybridizable discontinuous Galerkin (HDG) methods; we do that in the framework of steady-state diffusion problems. We begin by revisiting the classic techniques of *static condensation* of continuous finite element methods and that of *hybridization* of mixed methods, and show that they can be reinterpreted as discrete versions of a characterization of the associated exact solution in terms of solutions of Dirichlet boundary-value problems on each element of the mesh which are then patched together by transmission conditions across interelement boundaries. We then define the HDG methods associated to this characterization as those using discontinuous Galerkin (DG) methods to approximate the local Dirichlet boundary-value problems, and using weak impositions of the transmission conditions. We give simple conditions guaranteeing the existence and uniqueness of their approximate solutions, and show that, by their very construction, the HDG methods are amenable to static condensation. We display their stabilization and minimization properties, and end by briefly discussing their extension to other PDEs.

Hybridizable discontinuous Galerkin methods for third-order equations

Bo Dong
Department of Mathematics, University of Massachusetts Dartmouth, USA

Email: bdong@umassd.edu

We develop and analyze new hybridizable discontinuous Galerkin (HDG) methods for solving stationary and time-dependent third-order equations. The approximate solutions are defined by discrete versions of characterizations of the exact solution in terms of the solutions to local problems on each element patched together through transmission conditions. For stationary

linear third-order equations, we prove the superconvergence of projection of errors, numerical traces, and post-processed solutions. For third-order KdV type equations, we prove that the semi-discrete schemes are stable with proper choices of stabilization functions and have optimal convergence rates in the linear case. Numerical results are displayed to verify our error estimates.

(Joint work with Bernardo Cockburn and Yanlai Chen)

Stable polynomial extensions for polynomial-degree-robust potential and flux reconstruction in three space dimensions

Alexandre Ern*, Martin Vohralík
University Paris-Est, CERMICS (ENPC), 77455 Marne la Vallee cedex 2, France; INRIA Paris, 2 rue Simone Iff, 75589 Paris, France
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We study extensions of piecewise polynomial data prescribed on faces and possibly in elements of a patch of simplices sharing a vertex. In the H^1 setting, we look for functions whose jumps across the faces are prescribed, whereas in the $H(\mathrm{div})$ setting, the normal component jumps and the piecewise divergence are prescribed. We show stability in the sense that the minimizers over piecewise polynomial spaces of the same degree as the data are subordinate in the broken energy norm to the minimizers over the whole broken H^1 and $H(\mathrm{div})$ spaces. Our proofs are constructive and yield constants independent of the polynomial degree. One particular application of these results is in a posteriori error analysis, where the present results justify polynomial-degree-robust efficiency of potential and flux reconstructions.

Narrow-Stencil Finite Difference Methods and Discontinuous Methods for Fully Nonlinear Second PDEs

Xiaobing Feng
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In this talk I shall first present a newly developed narrow-stencil finite difference framework for approximating viscosity solutions of fully nonlinear second order PDEs (such as Hamilton-Jacobi-Bellman and Monge-Ampere equations). The focus of the talk will be on discussing how to compensate the loss of monotonicity of the schemes (due to the use of narrow stencils) in order to ensure the convergence of the schemes, and to explain some key new concepts such as generalized monotonicity, consistency and numerical moment. The connection between the proposed methods and some well-known finite difference methods for first order Hamilton-Jacobi equations will be explained. I shall then discuss how to extend these finite difference techniques to the (high order) discontinuous Galerkin setting, This talk is based on some recent joint works with Tom Lewis of the University of North Carolina and Chiu-Yen Kao of Claremont Mckenna College in California.

Mixed formulation and efficient numerical solution of Ginzburg–Landau equations

Huadong Gao
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In this presentation, we propose a new numerical approach to the time dependent Ginzburg–Landau (GL) equations under the temporal gauge (zero electric potential gauge). The approach is based on a mixed formulation of the GL equations, which consists of two parabolic equations for the order parameter ψ and the magnetic field $\sigma = \mathbf{curl}\,\mathbf{A}$, respectively and a vector ordinary differential equation for the magnetic potential $\mathbf{A}$. A fully linearized Galerkin FEM is presented for solving the mixed GL system. The new ap-

proach offers many advantages on both accuracy and efficiency over existing methods. In particular, the equations for ψ and σ are uniformly parabolic and therefore, the method provides optimal-order accuracy for the two physical components ψ and σ. Since in the temporal direction, a fully linearized backward Euler scheme is used for ψ and σ and a forward Euler scheme is used for $\mathbf{A}$, respectively, the system is fully decoupled and at each time step, the three variables ψ, σ and $\mathbf{A}$ can be solved simultaneously. Moreover, we present numerical comparisons with two commonly-used Galerkin methods for the GL equations under the temporal gauge and the Lorentz gauge, respectively. Our numerical results show that the new approach requires less iterations for solving the linear systems arising at each time step and the computational cost for the vector ODE seems neglectable. Several numerical examples in both two and three dimensional spaces are investigated.

(Joint work with Weiwei Sun)

Superconvergence and A Posteriori Error Estimators for Raviart–Thomas Mixed Finite Element Methods

Kwang-Yeon Kim
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Nowadays there are well-established superconvergence results for standard continuous finite element methods under certain conditions on the structure of the underlying meshes. Such results are useful in the design and analysis of postprocessing schemes which lead to higher-order approximations. They are also crucially used in showing that some a posteriori error estimators are asymptotically exact. In this talk we will discuss superconvergence of the vector variable for triangular Raviart–Thomas mixed finite element methods. Some old results on uniform meshes are first introduced and then extended to mildly structured meshes for the first- and second-order elements, as was done for primal finite elements. We will also present several a posteriori error estimators for the first-order element which are proved to be asymptotically exact by means of these superconvergence results.

Convergence of finite element solutions of stochastic time-fractional PDEs driven by a space-time white noise

Buyang Li
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The stochastic time-fractional equation

$$\partial_t \psi - \Delta \partial_t^{1-\alpha} \psi = f + \dot{W},$$

with space-time white noise $\dot{W}$, is discretized in time by a backward-Euler convolution quadrature, discretized in space by truncating a series representation of the space-time white noise. The truncated problem is solved by the Galerkin finite element method. For the resulting fully discrete numerical scheme, we prove the convergence

$$\mathbb{E}\|\psi(\cdot, t_n) - \psi_n^{(h)}\|_{L^2(\mathcal{O})} = \begin{cases} O\big(\tau^{\frac{1}{2}-\frac{\alpha d}{4}} + \ell_h h^{\frac{1}{\alpha}-\frac{d}{2}}\big) & \text{if } \alpha \in \Big[\dfrac{1}{2}, \dfrac{2}{d}\Big), \\ O\big(\tau^{\frac{1}{2}-\frac{\alpha d}{4}} + h^{2-\frac{d}{2}}\big) & \text{if } \alpha \in \Big(0, \dfrac{1}{2}\Big), \end{cases}$$

which is sharp up to a logarithmic factor $\ell_h = \ln(2 + 1/h)$, in general d-dimensional spatial domains with nonsmooth data $\psi_0 \in L^2(\mathcal{O})$ and $f \in L^p(0, T; L^2(\mathcal{O}))$, $p > \frac{4}{2+\alpha d}$, $d = 1, 2, 3$.

The main contributions of this paper are the following.

(1) An interesting phenomenon found: the spatial order of convergence increases to $2 - \frac{d}{2}$ as α decrease to $\frac{1}{2}$, and stays at this maximal convergence rate when α further decreases.

(2) Less regularity assumption on f: for the deterministic problem (i.e., $\varepsilon = 0$), the error estimates in the literature rely on certain regularity of $\frac{\partial f}{\partial t}$. We relax such conditions to $f \in L^p(0, T; L^2(\mathcal{O}))$.

(Joint work with Max Gunzburger, Buyang Li and Jilu Wang)

DG methods for Maxwell's equations in dispersive media: from a priori and posteriori error analysis to applications in invisibility cloak simulation

Jichun Li
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In this talk, I'll present an overview of various DG methods we developed for solving Maxwell's equations in dispersive media, which parameters depend on the wave frequency. More specifically, we will present: (1) The IPDG method for Maxwell's equations in cold plasma model with optimal a priori error estimate and posteriori error analysis; (2) Nodal DG method for time-dependent Maxwell's equations in metamaterials with a priori error estimate and simulation of backward wave propagation; (3) A posteriori error analysis for time-dependent Maxwell's equations with edge elements; (4) Adaptive edge finite element method for cloaking simulation. Some open issues will be mentioned.

Reduced stabilization for the HDG method

Issei Oikawa
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The reduced stabilization for the hybridizable discontinuous Galerkin (HDG) method was firstly proposed by Lehrenfeld and Schöberl. The key idea of the reduced stabilization is to introduce an L^2-orthogonal projection in a stabilization term, which is called the Lehrenfeld-Schöberl (LS) projection. It is known that the reduced stabilization is effective for the Poisson equation, linear elasticity problems, convection-diffusion problems, Navier-Stokes equations, and so on. In this talk, we present a brief overview of the reduced stabilization and discuss some related topics.

A Mixed Discontinuous Galerkin method for incompressible magnetohydrodynamics

Ke Shi
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In this talk we propose and analyze a mixed DG method for the stationary Magnetohydrodynamics (MHD) equations. The numerical scheme is based a recent work proposed by Houston et. al. for the linearized MHD. With a novel discrete Sobolev embedding type estimate for the discontinuous polynomials, we provide a priori error estimates for the method on the nonlinear MHD equations. In the smooth case, we have optimal convergence rate for the velocity, magnetic field and pressure in the energy norm, the Lagrange multiplier only has suboptimal convergence order. With the minimal regularity assumption on the exact solution, the approximation is optimal for all unknowns. We will present a novel L^3-norm estimate for discrete polynomials which plays a key rule in the analysis.

(Joint work with Weifeng Qiu)

A nonconforming finite element on polygonal meshes

* Yanqiu Wang
School of Mathematical Sciences, Nanjing Normal university, China
Email: yqwang@njnu.edu.cn

A nonconforming lowest order Crouzeix-Raviart type finite element is constructed on polygonal meshes. Local construction in each polygon depends on whether the polygon has odd or even number of vertices. Because of this, the topological structure of connected regions consisting of polygons with even number of vertices plays an essential role in understanding the global finite element space. To analyze such topological structure, a new technique tool using the concept of cochain complex and cohomology is developed. Despite the seemingly complicated theoretical analysis, implementation of the element is straight-forward. The nonconforming finite element method has optimal a priori error estimates and supporting numerical results are presented.

Finite element method and its analysis for a nonlinear Helmholtz equation with high wave numbers

Haijun Wu
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The well-posedness of a nonlinear Helmholtz equation with an impedance boundary condition is established for high frequencies in two and three dimensions. Stability estimates are derived with explicit dependence on the wave number. Linear finite elements are considered for the discretization of the nonlinear Helmholtz equation, and the well-posedness of the finite element systems is analyzed. Stability and preasymptotic error estimates of the finite element solutions are achieved with explicit dependence on the wave number. Numerical examples are also presented to demonstrate the effectiveness and accuracies of the proposed finite element method for solving the nonlinear Helmholtz equation.

(Joint work with Jun Zou)

Arbitrary Lagrangian-Eulerian discontinuous Galerkin method for conservation laws

Y. Xia
School of Mathematical Sciences, University of Science and Technology of China, China
Email: yhxia@ustc.edu.cn

In this talk, we present and analyze an arbitrary Lagrangian-Eulerian discontinuous Galerkin (ALE-DG) method with a time-dependent approximation space for conservation laws, which satisfies the geometric conservation law. For the semi-discrete ALE-DG method, when applied to nonlinear scalar conservation laws, a cell entropy inequality, L^2 stability and error estimates are proven. More precisely, we prove the sub-optimal $(k+\frac{1}{2})$ convergence for monotone fluxes, and optimal $(k+1)$ convergence for an upwind flux, when a piecewise P^k polynomial approximation space is used. For the fully-discrete

ALE-DG method, the geometric conservation law and the local maximum principle are proven. We also state conditions for slope limiters, which ensure total variation stability of the method.

(Joint work with C. Klingenberg and G. Schnücke)

High order energy stable and efficient local discontinuous Galerkin methods for the Cahn-Hilliard-Navier-Stokes equation

Yan XU
University of Science and Technology of China
Email: yxu@ustc.edu.cn

The goal of this talk is to propose two energy stable fully discrete local discontinuous Galerkin (LDG) finite element methods for the Cahn-Hilliard-Navier-Stokes (CHNS) equation. Based on the method of lines, we first construct an LDG method and prove the semi-discrete energy stability. Then, we develop a first order and a second order semi-implicit convex splitting schemes based on a convex splitting principle of the discrete Cahn-Hilliard energy, and prove the corresponding unconditional energy stabilities. In addition, a semi-implicit spectral deferred correction (SDC) method combining the first order convex splitting scheme is employed to improve the temporal accuracy. The SDC method is high order accurate and stable numerically with the time step proportional to the spatial mesh size. The resulting algebraic equations at the implicit level are nonlinear. Due to the local properties of the LDG methods, the resulting implicit scheme is easy to implement and can be solved in an explicit way when it is coupled with iterative methods. An efficient nonlinear multigrid method are used to solve the equations. Numerical experiments of the accuracy and long time simulations are presented to illustrate the high order accuracy in both time and space, the capability and efficiency of the proposed methods.

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

Zhiwen Zhang
Department of Mathematics, The University of Hong Kong, Hong Kong
Email: zhangzw@hku.hk

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.
(Joint work with Houde Han)

Workshop on Recent Advances in Finite Element Methods 2017
City University of Hong Kong
13-15 March 2017

Practical Information

❖ **How to get to the Workshop Venue**

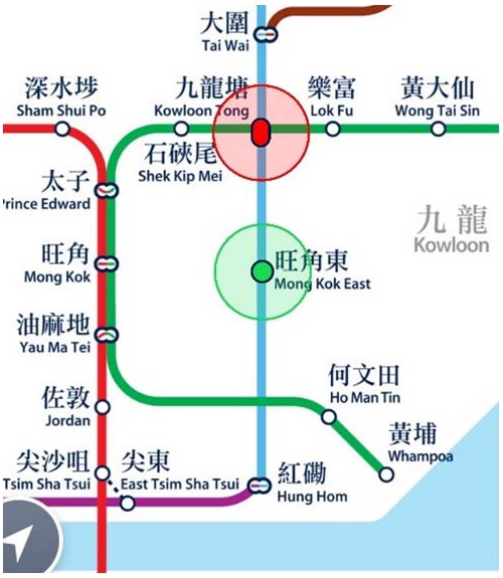
Conference Room 1,
Block 1, To Yuen Building
City University of Hong Kong
31 To Yuen Street
Kowloon Tong
Hong Kong

In Chinese:
九龍塘桃源街 **31** 號
香港城市大學桃源樓 一號會議室

❖ **If you arrive by Mass Transit Railway (MTR) East Rail Line**
(e.g. from Mong Kok East, location of your accommodation: Royal Plaza Hotel)

Please get off at **Kowloon Tong station**, which is only one stop away from Mong Kok East Station. (http://mtr.com.hk/archive/en/services/routemap.pdf)

Then follow the signs to **Exit H** or **Exit C2**, which leads to the Festival Walk shopping centre. You need to walk through the shopping Centre to reach City University of Hong Kong.



Remarks:
Dr Frederick Qiu will be expecting you at the lobby of Royal Plaza Hotel on Monday 13 March at 8:15AM, to show you the way to the Workshop Venue. Please kindly be on time. ☺

❖ **If you arrive by taxi to the workshop Venue:**
Ask the taxi driver to take you to 九龍桃源街三十一號 香港城市大學桃源樓
See **map** of the following links for the taxi driver:
http://www6.cityu.edu.hk/wayfinder/tc/Building/TYB/ (Chinese)
http://www6.cityu.edu.hk/wayfinder/en/Building/TYB/ (English)

❖ Contacts of Liu Bie Ju Centre for mathematical Sciences

Liu Bie Ju Centre for Mathematical Sciences
Y-6501 & Y6503 (yellow zone, besides lift No.9)
Academic Building 1,
City University of Hong Kong

Email: lbj@cityu.edu.hk
Conference secretary: Sophie Xie (Tel: +852 3442 9816)
Conference assistant: Zoe Cheung (Tel: +852 3442 6570)
Conference assistant: Carol Chan (Tel: +852 3422 8640)

❖ Workshop Banquet

Restaurant: **Staff Lounge, City Top Restaurant, 9/F, City University Amenities Building**
香港城市大學康樂樓九樓 城峰閣
Date: **14 March 2017 (Tuesday) evening**
Time: **18:30**

To find the way:
http://www6.cityu.edu.hk/wayfinder/tc/Venue/CTREST/ (In Chinese)
http://www6.cityu.edu.hk/wayfinder/en/Venue/CTREST/ (in English)

❖ Computer & Internet Services

Networked computers are available at Mathematical Laboratory during the conference period:

Date: 13-15 March 2017

Time: 9:00 to 18:00

Venue: Y6504, 6/F, Academic 1, Yellow Zone (near lift 9)

Wireless internet access through your own mobile device within CityU campus is also available.

Login name and password will be distributed in your name badge during registration.
Network of the wireless Internet access: CityU WLAN (WPA) / Universities WiFi

❖ Banking Service

Opening Hours: 9:00 to 17:00 (Monday to Friday)

The Hang Seng Bank at CityU is located next to Run Run Shaw Library at 3/F, Academic 1. Foreign currency exchange service is provided and travelers cheques can be cashed.

- **Octopus Card**

Make use of the Octopus Card, an electronic fare card that is accepted by almost all forms of public transport, and at many fast food chains and stores. It's easy and convenient to use, save time and eliminates the need for small change. Add money to it whenever you need to, and any unspent value in On-Loan Octopus is refundable along with the HKD50 deposit (minus HKD7 handling fee for cards returned within three months). You can also opt for a non-returnable Sold Octopus. For more details, please refer to: http://www.octopus.com.hk/home/en/index.html

Remarks: You may not need this information, but just in case some of your friends or family members are coming with you, please note that passengers over 65 years old can get the Elder Octopus card, which has 50% discount for each ride.

- **Voltage & Plug Type**
  220 volts AC, 50Hz
  Plug type used in Hong Kong is as shown as the right image.

- **Currency**
  The legal tender is the Hong Kong dollar (HKD). Credit cards are accepted in major hotels as well as shopping malls. The exchange rate is USD1.00 ≈ HKD7.80.

- **Hong Kong Tourism Board**
  Below is some useful information about Hong Kong for visitors' convenience. More details can be found at the Hong Kong Tourist Board website **www.discoverhongkong.com.**

- **Hong Kong weather broadcast for next week**
  http://www.hko.gov.hk/wxinfo/currwx/fnd.htm

- **Adaptor**

For speakers who need to use Macintosh (Mac pro, Mac book…), please kindly be reminded to bring the adaptor (if you have) for your laptop with you for the presentation. Thank you!

Catering Outlets

Restaurant	Location	Opening Hours	Remarks
City Express	5/F Academic 1	07:30–21:00 (Monday–Sunday)	Fast food
City Chinese Restaurant	8/F Amenities Building	11:00–22:30 (Monday–Saturday) 09:30–22:30 (Sunday and public holidays)	Chinese menu with full selection
City Top	9/F Amenities Building	11:30–22:30 (Monday–Sunday)	Western menu
Garden Café	G/F Academic Exchange Building	08:00–21:00 (Monday–Friday) 08:00–17:00 (Saturday) Closed on Sundays and public holidays	Cafeteria
Temporary Coffee Cart	Purple Zone, 4/F Academic 1	08:00–21:00 (Monday–Friday) 08:00–17:00 (Saturday) Closed on Sundays and public holidays	Cafeteria
AC2 Canteen	3/F Academic 2	07:30–21:00 (Monday–Sunday)	Fast food
AC3 Cafe – Delifrance	3/F Academic 3	08:00–21:00 (Monday–Sunday)	Cafeteria
Coffee Area – Delifrance	3/F, covered terrace next to Cheng Yick Chi Building	08:00–20:00 (Monday–Friday) 08:00–17:00 (Saturday, Sunday and public holidays)	Cafeteria
AC3 Bistro	7/F, Academic 3	07:30–21:00 (Monday–Saturday) Closed on Sundays and public holidays	Western food
5380 Cafe (Kebab Station)	5/F Amenities Building	11:00–20:00 (Monday–Sunday)	Hot halal food and kebab

Besides CityU campus, the adjacent shopping mall Festival Walk also provides choices of over 30 restaurants for dining.

Recent Advances in Finite Element Methods 2017 (RAFEM 2017)