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# The Hong Kong Polytechnic University **Department of Applied Mathematics**

### Colloquium

### Finite element and discontinuous Galerkin methods for linear elliptic PDEs in non-divergence form

By

## **Prof. Xiaobing FENG**

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#### Abstract

In this talk, I shall present some recently developed continuous Galerkin (i.e, finite element) methods and discontinuous Galerkin (DG) methods for approximating strong solutions of a class of linear elliptic PDEs in non-divergence form whose leading coefficients are only continuous or even only belong to the space of vanishing mean oscillation (VMO). Such PDEs are building blocks of fully nonlinear Hamilton-Jacobi-Bellman equations arising from stochastic optimal control and financial mathematics. The proposed numerical methods can use either  $\overline{C}^0$  or  $L^2$  finite element spaces, they are simple to implement and can be done using standard finite element or DG codes. On the other hand, the convergence analysis of the methods is quite involved and very technical, it requires establishing finite element and DG discrete Calderon-Zygmund estimates, which will be discussed in detail in the talk. Numerical experiments will be presented to demonstrate the effectiveness of the proposed finite element and DG methods.

#### **Biography**

Professor Feng received Bachelor and Master degrees from Xi'an Jiaotong University, and PhD degree from Purdue University. He is currently Professor and Head of Department at Department of Mathematics, University of Tennessee, USA. His research interests include the numerical solution and analysis of nonlinear partial differential equations, stochastic partial differential equations, phase field equations, fractional calculus, and so on. He has published over 100 papers in world-class professional academic journals, including SIAM Review, SIAM J. Numerical Analysis, Mathematics of Computation, Numerische Mathematik, SIAM J. Mathematical Analysis, Transaction of American Mathematical Society.

Date: 6 December 2022 (Tuesday) Time: 10:00-11:00 (Hong Kong Standard Time GMT +8) Venue: Online Talk via Zoom (Meeting ID: 947 3972 3705) Speaker: Prof. Xiaobing Feng, The University of Tennessee, Knoxville Host: Dr. Buyang Li, The Hong Kong Polytechnic University Click to join: https://polyu.zoom.us/j/94739723705?pwd=d1Q2M2xwdFR0ZnJYaXFOL0ttSll0Zz09



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