

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

**Colloquium**

**An Augmented Method for Stokes-Darcy FSI Problems  
& A New FEM-FD method**

**By**

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**Abstract**

In this talk, a new decoupling method based on Cartesian meshes is proposed for a fluid structure interaction between a fluid flow modelled by the Stokes equations and a porous media modelled by the Darcy's law. Such a model has many applications including oil industry and mathematical biology. The idea is to introduce several interface variables so that the problems can be solved through several Helmholtz/Poisson equations for which a fast Poisson solver can be utilized. The augmented variables that have co-dimensioned one compared with that of the velocity and pressure are chosen so that the BJS conditions are satisfied. Numerical examples are also presented. We have showed the equivalence between the original problem and the transformed one. One interesting question is how to solve the resulted Schur complement system efficiently.

If time allows, I will also present a recent work on anisotropic interface problem using a new finite element-finite difference (FE-FD) method that combines a finite element discretization (away from the interface) whose coefficient matrix is a symmetric semi-positive definite, with a finite difference discretization (near or on the interface) whose coefficient matrix part has properties of an M-matrix.

**Date : 22 January, 2021 (Friday)**

**Time : 10:00-11:00 (Hong Kong Standard Time GMT +8)**

**Venue : Online Talk via Zoom(Meeting ID: 976 9719 2650)**

**Speaker: Prof. Zhilin Li, North Carolina State University**

**Host: Dr. Qiao Zhonghua, The Hong Kong Polytechnic University**

**Click to join : <https://polyu.zoom.us/j/97697192650>**



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**\*\*\* ALL ARE WELCOME \*\*\***

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