

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

**Seminar**

**A multiple-relaxation-time lattice Boltzmann method with  
Beam-Warming scheme for coupled chemotaxis-fluid model**

**By**

**Dr. Xuguang Yang**

**School of Mathematics and Computational Science  
Hunan First Normal University**

**Abstract**

In this work, a novel lattice Boltzmann method (LBM) with Beam-Warming (B-W) scheme is proposed to solve coupled chemotaxis-fluid model. Through Chapman-Enskog analysis, the proposed LBM can correctly recover to the chemotaxis-fluid model. The stability of the proposed LBM is enhanced by the B-W scheme. In the numerical experiments, several different sets of Keller-Segel equations, which are all amenable to exact solutions with/without coupling with the incompressible Navier-Stokes (N-S) equations, are solved to numerically verify the proposed LBM. Furthermore, we investigate numerically falling bacterial plumes caused by bioconvection by solving the chemotaxis-fluid coupled system.

**Date : 31 March, 2020 (Tuesday)**

**Time : 10:00a.m. – 11:00a.m.**

**Venue: Online Talk via Tencent QQ**

(the talk will be given by Putonghua with slides in English)

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

For enrolment, please send your QQ number to [chingching.lu@polyu.edu.hk](mailto:chingching.lu@polyu.edu.hk) on or before 29 March 2020, Sunday.