



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Some branch-free high precision algorithms

By

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Abstract

In some numerical computational problems such as Semidefinite Programming (SDP), as the solution converging to the boundary of Semidefinite Cone, its eigenvalues will tend to 0 which makes computation of next step an ill-posed problem. Double-precision floating-point arithmetic which is the highest precision in the CPU and GPU is insufficient in problems like Semidefinite Programming. To use higher precision in computers without manufacturing new chips, people develop high-precision libraries such as GNU Multiple Precision Floating-Point Reliable Library (MPFR), Bailey's quadratic double (QD) lib, Cuda Multiple Precision Arithmetic Library (CAMPARY) and so on.

However, the algorithms above need to use logical processors in computers. It will generate different branches in the algorithm which makes it impossible to use Single Instruction, Multiple Data (SIMD) technique in CPU and GPU. We develop some branch-free algorithms to fully use SIMD technique.

Date : 6 May 2026 (Wednesday)

Time : 3:00pm

Venue : Room 2611 (near Lifts 31/32)

All are Welcome!