

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

**Colloquium**

**Localized Exponential Time Differencing Methods:  
Algorithms and Analysis**

**By**

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**Abstract**

Exponential time differencing (ETD) has been proven to be very effective for solving stiff evolution problems in the past decades due to rapid development of matrix exponential algorithms and computing capacities. While direct parallelization of the ETD methods is rarely of good efficiency due to the required data communication, the localized exponential time differencing approach was recently introduced for extreme-scale phase field simulations of coarsening dynamics, which displayed excellent parallel scalability in modern supercomputers. The main idea is to use domain decomposition techniques to reduce the size of the problem, so that one instead only solves a group of smaller-sized subdomain problems simultaneously using the locally computed products of matrix exponentials and vectors. With the diffusion equation as the model problem, we will develop and analyze some overlapping and nonoverlapping localized ETD schemes and their solution algorithms. Numerical experiments are also carried out to confirm the theoretical results. This work is to serve as the first step toward building a solid mathematical foundation for localized ETD methods.

**Date : 29 May, 2020 (Friday)**

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

**Venue : Online Talk via Zoom(Meeting ID: 922 2255 5181)**

**Click to join : <https://polyu.zoom.us/j/92222555181>**

\* The Talk will be given in English.



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

For enrolment, please send your name and email to [chingching.lu@polyu.edu.hk](mailto:chingching.lu@polyu.edu.hk) on or before 28 May 2020, Thursday.