

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

**Colloquium**

Higher order energy stable ETD based methods for gradient flows

**By  
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**Abstract**

Many natural and engineering problems follow gradient flow structures in the sense that systems evolve to decrease certain energy. The dynamics of most of these gradient systems are complicated and hence numerical methods are called for. There are several desirable features for numerical algorithms for gradient flows with long evolution process: 1. efficiency; 2. higher-order accuracy; and 3. long-time stability. We present a class of efficient higher-order energy stable variable step methods for a class of gradient flows based on the exponential time differencing (ETD) method combined with multi-step methods and interpolation. As a specific example, we present a third order ETD based scheme for thin film epitaxial growth model together with numerical results establishing the convergence and stability of the scheme, and the ability of the scheme to capture long-time scaling properties of the system.

**Date : 30 March 2021 (Tuesday)**

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

**Venue : Online Talk via Zoom (Meeting ID: 926 0161 9057)**

**Speaker : Prof. Xiaoming Wang, Southern University of Science and Technology**

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

**Click to join:**

<https://polyu.zoom.us/j/92601619057?pwd=WmVVd1BGeTVyeFZYMTR4ZHBjbGU2QT09>



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

For enrolment, please send your name and email to [shuk-wai.ko@polyu.edu.hk](mailto:shuk-wai.ko@polyu.edu.hk) on or before 29 March 2021