



## The Hong Kong Polytechnic University Department of Applied Mathematics

## Colloquium

# A weakly nonlinear, energy stable scheme for the strongly anisotropic Cahn-Hilliard system

By

## Prof. Cheng WANG University of Massachusetts Dartmouth

### Abstract

The strongly anisotropic Cahn-Hilliard model is considered. In particular, a highly nonlinear anisotropic surface energy makes the PDE system very challenging at both the analytic and numerical levels. In this talk, a convexity analysis is performed to the surface energy potential, and a careful estimate reveals that all its second order functional derivatives stay uniformly bounded by a global constant. In turn, a linear approximation becomes available for the surface energy part, and a detailed estimate demonstrates the corresponding energy stability. Its combination with the implicit treatment of the nonlinear double well potential terms yields a weakly nonlinear, energy stable scheme for the whole system. Moreover, with a careful application of the global bound for the second order functional derivatives, an optimal rate convergence analysis becomes available, which is the first such result in this area. Some numerical simulation results are also presented in the talk.



Date: 16 November 2022 (Wednesday) Time: 9:00-10:00 (Hong Kong Standard Time GMT +8) Venue: Online Talk via Zoom (Meeting ID: 957 2286 2096) Speaker: Prof. Cheng Wang, University of Massachusetts Dartmouth Host: Dr. Xiao Li, The Hong Kong Polytechnic University Click to join: https://polyu.zoom.us/j/95722862096?pwd=OWMxVHdlOllSOklwTXlmeldoNTA1UT09

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