

HIGH-ORDER STRUCTURE-PRESERVING METHODS FOR PHASE-FIELD MODELS

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ABSTRACT

Phase-field models are widely used to capture interface dynamics in new materials, lithium batteries and biomolecular systems, etc. This minisymposium focuses on state-of-the-art high-order structure-preserving algorithms that rigorously preserve intrinsic physical structures of phase-field models. All contributions include complete theoretical analysis and practical numerical implementations. We intend to connect theorists and application-oriented computational scientists to address open challenges in constructing high-order, linear-decoupled, adaptive structure-preserving schemes for industrial multi-scale simulations.

SPEAKERS

Here are perspective speakers and titles for minisymposium “High-Order Structure-Preserving Methods for Phase-Field Models”.

1. Guanghui Hu (University of Macau): A gradient flow model for ground state calculations in wigner formalism based on density functional theory

2. Qing Cheng (Tongji University): Adaptive time-stepping and maximum-principle-preserving flow dynamic approach for gradient flows
3. Daozhi Han (State University of New York at Buffalo): Super-convergent HDG methods for the Cahn-Hilliard equation
4. Fukeng Huang (Eastern Institute of Technology, Ningbo): A generalized SAV approach for nonlinear dissipative systems
5. Jie Shen (Eastern Institute of Technology, Ningbo): Structure-preserving compact splitting methods for Schrödinger-type equations
6. Xiaoming Wang (Eastern Institute of Technology, Ningbo): High-order energy stable numerical schemes for gradient flows
7. Xiaoping Wang (The Chinese University of Hong Kong (Shenzhen)): Adaptive feature capture method for solving partial differential equations with near singular solutions
8. Dong Wang (The Chinese University of Hong Kong (Shenzhen)): The prediction-correction iterative convolution-thresholding method for thermal-fluid topology optimization
9. Jiang Yang (Southern University of Science and Technology): A second-order product-type implicit-explicit Runge-Kutta method preserving unit length and energy dissipation structures for gradient flows of vector fields
10. Chaoyu Quan (The Chinese University of Hong Kong (Shenzhen)): Energy Dissipation Analysis of Implicit-Explicit Linear Multistep Methods for Gradient Flows Using General Multipliers