

**Title : Error Analysis and Numerical Simulations of the SAV
Finite Difference Methods for Gradient Flows**

by

Xiaoli Li (xiaolisdu@126.com)

Abstract: In this talk, we shall first present construction and analysis of the block-centered finite difference methods for the spatial discretization of the scalar auxiliary variable Crank-Nicolson scheme (SAV/CN-BCFD) for gradient flows, and show rigorously that the constructed schemes are second-order in both time and space in various discrete norms. When equipped with an adaptive time strategy, the SAV/CN-BCFD schemes are accurate and extremely efficient. Then we will discuss how to construct a numerical scheme based on the SAV approach in time and the MAC discretization in space for the Cahn-Hilliard-Navier-Stokes phase field model, and carry out stability and error analysis. Finally numerical simulations are demonstrated the robustness and accuracy of our schemes.