THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Numerical Study of Schrodinger Equations with Random Potentials

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Abstract

In this talk, we study the Schrodinger equation with random potentials. The application of the stochastic collocation method on this equation is investigated. Since the stochastic collocation method is based on the theory of polynomial interpolation, the convergence in the random space is related to the stochastic regularity of the solution. An analysis of the stochastic regularity for the Schrodinger equation in the whole space is given. Both the theoretical analysis and numerical results show that the smoother the potential and initial data are w.r.t. the random variable, the faster the convergence in the random space is. We then further study the Schrodinger equation with a periodic potential and a random external potential, by combining the Bloch decomposition based time splitting pseudospectral (BDTS) method and the stochastic Galerkin (SG) method. We analyse the stability and local temporal error of the combined method and prove that the new method conserves the discrete mass in the sense of expectation. Numerical results show that the new method maintains the advantages of both BDTS and SG methods. Moreover, besides the discrete mass, this method approximately conserves the discrete energy in the sense of expectation.

Date:	September 14, 2021 (Tuesday)
Time:	4:00 – 5:00pm (Hong Kong Time)
Venue:	Room 210, Run Run Shaw Bldg., HKU and ZOOM: https://hku.zoom.us/j/ Meeting ID: 913 6532 3891 Password: 310656

All are welcome