2013分析與微分方程研討會

2013 Workshop on Analysis and Differential Equations

國立新竹教育大學應用數學系

2013/11/29

2013 分析與微分方程研討會議程

11 月 29 日(星期五)

2013 年 11 月 29 日(星期五) 地點：推廣大樓 9407 室		
Time	Speaker	Title
08：00～08：30	報到	
08：30～09：00	開幕典禮---系主任致詞	
主持人：李金龍		
09：10～10：00	謝天長	Bifurcation analysis for the superconducting/normal phase transition of the Ginzburg-Landau system
主持人： 陳正忠		
10：10～11：00	沈俊嚴	Two Weight Theorem for Singular Integrals
11：10～12：00	陳中川	The Orbit of Convolution Operators
12：00～13：00	Lunch Time	
主持人：李俊璋		
13：10～14：00	郭鴻文	Equilibrating effect of Maxwell-type boundary condition in highly rarefied gas
主持人：陳人豪		
14：10～15：00	鄭博文	Spectral collocation and a two-level continuation scheme for dipolar Bose-Einstein condensates
15：10～16：00	施因澤	Tailored finite point method for numerical solutions of singular perturbed eigenvalue problems

Bifurcation analysis for the superconducting/normal phase transition of the Ginzburg-Landau system

Tien-Tsan Shieh*,[1]

[1]Department of Applied Mathematics, National Chiao Tung University, Hsinchu 300, Taiwan

Abstract

In the talk, I will shortly introduce the Ginzburg- Landau system of superconductivity. When lowering the temperature, superconductors become the superconducting state from the normal state. In order to study this phase transition phenomena, we present a bifurcation and stability analysis on the Ginzburg- Landau system of superconductivity with an applied magnetic field and the de Gennes boundary condition. It is proved there are two different kinds of phase transition from the normal state to the superconducting state: one is jump transition and the other is continuous transition.

*tshieh@math.nctu.edu.tw

Two Weight Theorem for Singular Integrals

Chun-Yen Shen*,[1]

[1]Department of Mathematics, National Central University, Chungli 32001, Taiwan

Abstract

One of the central open problems in harmonic analysis was to find a real variable characterization for the boundedness of singular integrals in two weights setting. A conjecture was formulated by Nazarov-Treil-Volberg in early 20s in the flavor of the famous T1 theorem of David-Journe. In this talk, we will discuss the history of the famous two weight problem and outline our proof which solves this longstanding conjecture.

*cyshen@math.ncu.edu.tw

The Orbit of Convolution Operators *

Chung-Chuan Chen[†,1]

[1]Department of Mathematics Education, National Taichung University of Education, Taichung 403, Taiwan

Abstract

Recently dynamics of linear operators have been studied intensely since the work of Birkhoff and MacLane. In this talk, we will determine when a weighted convolution operator on the Lebesgue space of a locally compact group is topologically transitive under some condition on the weight. The condition can be strengthened to characterize chaotic and topologically mixing convolution operators.

*This is joint work with Professor Cho-Ho Chu.

[†]chungchuan@mail.ntcu.edu.tw

Equilibrating effect of Maxwell-type boundary condition in highly rarefied gas

Hung-Wen Kuo*,[1]

[1]Department of Mathematics, National Cheng Kung University, Tainan 701, Tainwan

Abstract

We study the equilibrating effects of the boundary and intermolecular collision in the kinetic theory for rarefied gases. We consider the Maxwell-type boundary conditions, which have weaker equilibrating effect than the commonly studied diffuse reflection boundary condition. The gas region is the spherical domain in $\mathbb{R}^d$, $d = 1, 2$. First, without the equilibrating effect of the collision, we obtain the algebraic convergence rates to the steady state for free molecular flow with variable boundary temperature. The convergence behavior has intricate dependence on the accommodation coefficient of the Maxwell-type boundary condition. We then construct the steady state solutions of the full Boltzmann equation for large Knudsen numbers and small boundary temperature variation. We establish the nonlinear stability with exponential rate of the stationary Boltzmann solutions. The results hold for the models of Maxwell, hard potential, and hard sphere molecules. Our analysis is based on the explicit formulations of the boundary condition for symmetric domains.

*hwkuo@mail.ncku.edu.tw

Spectral collocation and a two-level continuation scheme for dipolar Bose-Einstein condensates

Bor-Wen Jeng*,[1]

[1]Department of Mathematics Education, National Taichung University of Education, Taichung 403, Taiwan

Abstract

We exploit the high accuracy of spectral collocation methods in the context of a twolevel continuation scheme for computing ground state solutions of dipolar Bose-Einstein condensates (BEC), where the first kind Chebyshev polynomials and Fourier sine functions are used as the basis functions for the trial function space. The governing Gross-Pitaevskii equation (or Schrödinger equation) can be reformulated as a Schrödinger-Poisson (SP) type system. The two-level continuation scheme is developed for tracing the first solution curves of the SP system, which in turn provide an appropriate initial guess for the Newton method to compute ground state solutions for 3D dipolar BEC. Extensive numerical experiments on 3D dipolar BEC and dipolar BEC in optical lattices are reported.

*bwjeng@mail.ntcu.edu.tw

Tailored finite point method for numerical solutions of singular perturbed eigenvalue problems

Yintzer Shih*,[1]

[1]Department of Applied Mathematics, National Chung Hsing University, Taichung 40227, Taiwan

Abstract

We propose two variants of tailored finite point (TFP) methods for discretizing two dimensional singular perturbed eigenvalue (SPE) problems. A continuation method and an iterative method are exploited for solving discretized systems of equations to obtain the eigen-pairs of the SPE. We study the analytical solutions of two special cases of the SPE, and provide an asymptotic analysis for the solutions. The theoretical results are verified in the numerical experiments. The numerical results demonstrate that the proposed schemes effectively resolve the delta function like of the eigenfunctions on relatively coarse grid.

*yintzer_shih@email.nchu.edu.tw