

2016 Taiwan-Japan Workshop on Dispersion, Navier Stokes, Kinetic, and Inverse Problems

(2016 台日分散、流體動力學、與反問題研討會)

Date: Dec. 24 2016 ~ Dec. 27 2016

Venue: Department of Mathematics, National Cheng Kung University

WebPage: http://www.ncts.ntu.edu.tw/events_2_detail.php?nid=121

Registration : <https://goo.gl/forms/WMDKOKGawZ7KTUp43>

Speakers from Taiwan:

National Center for Theoretical Sciences

National Taiwan University

National Tsing Hua University

National Cheng Kung University

1, Kazuo Aoki, NCTS, NTU, NCKU

2, Jin-Cheng Jiang, NTHU ,

3, Hsi-Wei Shih, NCKU ,

4, Hung-Wen Kuo, NCKU ,

5, Kung-Chien Wu, NCTS, NCKU ,

6, Ru-Lin Kuan, NCTS, NCKU ,

7, Manas Kar, NTU ,

8, Kuan-Hsiang Wang, NCKU ,

9, David Yang, NCKU ,

10, Pu Zhao Kow, NCKU ,

Speakers from Japan:

Tohoku University

Nagoya University

Kyoto University

Osaka University

1, Nakao Hayashi, Osaka Univ,

2, Jun-ichi Segata, Tohoku Univ,

3, Kotaro Tsugawa, Nagoya Univ,

4, Satoshi Masaki, Osaka Univ,

5, Nobu Kishimoto, Kyoto Univ,

6, I-Kun Chen, Kyoto Univ,

7, Masahiro Ikeda, Kyoto Univ,

8, Yohei Yamazaki, Kyoto Univ,

Organizers:

Yung-fu Fang (NCKU),

Ching-Lung Lin (NCKU),

Nakao Hayashi (Osaka Univ)

Kenji Nakanishi (Osaka Univ)

Sponsors:

National Center for Theoretical Sciences, National Cheng Kung University

2016 Taiwan–Japan Workshop on Dispersion, Navier Stokes, Kinetic, and Inverse Problems

2016/12/24 ~ 2016/12/27 at NCKU, Tainan, Taiwan

Program

Saturday(12/24)		Sunday (12/25)		Monday (12/26)		Tuesday(12/27)	
		Chair:		Chair:			
		0900~0950	Nobu Kishimoto	0900~0950	Kazuo Aoki	0900~1200	Informal Discussion
		0955~1040	Masahiro Ikeda	0955~1040	Kung-Chien Wu		
		1040~1100	Break	1040~1100	Break		
		Chair:		Chair:	Willie Hsia		
		1100~1145	Kotaro Tsugawa	1100~1145	Hung-Wen Kuo		
		1150~1230	Yohei Yamazaki	1150~1230	I-Kun Chen		
		1230~1400	Lunch	1230~1400	Lunch	1200~1400	Lunch
		Chair:		Chair:	Wen-Ching Lien	1400~1700	Informal Discussion
		1400~1445	Satoshi Masaki	1400~1445	Jin-Cheng Jiang		
		1450~1535	Hsi-Wei Shih	1450~1535	Daisuke Kawagoe		
		1535~1555	Break	1535~1555	Break		
		Chair:	Jyh-Hao Lee	Chair:	Tien-Tsan Shieh		
		1555~1640	Ru-Lin Kuan	1555~1640	Jun-ichi Segata		
1530~1620	Registration	1650~1730	Manas Kar	1650~1730	Kuan-Hsiang Wang		
1620~1630	Opening Ceremony	1730~1740	Pu Zhao Kow	1730~1740	David Yang		
Chair:							
1630~1730	Nakao Hayashi						
				1800 ~	Banquet		

Ching-Lung Lin

Yu-Chu Lin

Chair List Yu-Yu Liu

Jenn-Nan Wang

Chiun-Chuan Chen

Need more Chairs



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Titles and Abstracts

Dec. 25 2016

----- **Nakao Hayashi** -----

Title : *On the inhomogeneous fourth-order nonlinear Schrodinger equation*

Abstract : We consider the Cauchy problem for the inhomogeneous fourth-order Schrodinger equation with a cubic power nonlinearity. We find the large time asymptotics of solutions to the Cauchy problem. We use the factorization technique similar to that developed for the usual cubic Schrodinger equation.

----- **Nobu Kishimoto** -----

Title: *Weak dispersion limit for nonlinear Schrödinger equations with higher order corrections*

Abstract: We consider third- and fourth-order nonlinear Schrödinger-type equations. Our aim is to study the limit problem from these equations to the standard nonlinear Schrödinger equation with cubic nonlinearity as the coefficients of the higher-order dispersion and derivative nonlinear terms tend to zero. The main part of the proof is to establish local well-posedness for the initial value problem associated with these equations which is independent of the smallness of the higher-order dispersion.

----- **Kotaro Tsugawa** -----

Title: *Parabolic smoothing effect and local well-posedness of semilinear fifth order dispersive equations on the torus*

Abstract: We consider the Cauchy problem of fifth order dispersive equations with polynomial type nonlinearities depending on u , $\partial_x u$, $\partial_x^2 u$, $\partial_x^3 u$ under the periodic boundary condition. We show that they are grouped into two classes according to their nonlinear terms. When the nonlinear term is non-parabolic resonance type, we have the local well-posedness on $(-T, T)$. On the other hand, when the nonlinear term is parabolic resonance type, the local well-posedness holds with a smoothing effect only on $\partial\bar{\partial}$ either $[0, T)$ or $(-T, 0]$ and nonexistence result holds on the other time interval.

----- **Yohei Yamazaki** -----

Title: *Stability for line solitary waves of Zakharov-Kuznetsov equation*

Abstract: We consider the two dimensional Zakharov-Kuznetsov equation on $\mathbb{R} \times T_L$ which is one of a high dimensional generalization of Korteweg-de Vries equation, where T_L is the torus with the $2\pi L$ period. The orbital and asymptotic stability of the one soliton of Korteweg-de Vries equation on the energy space has been proved by Benjamin, Pego and Weinstein and Martel and Merle. We regard the one soliton of Korteweg-de Vries equation as a line solitary wave of Zakharov-Kuznetsov equation on $\mathbb{R} \times T_L$.

In this talk, we talk about the orbital stability and the asymptotic stability of the line solitary waves of Zakharov-Kuznetsov equation.

----- **Satoshi Masaki** -----

Title: *Two Minimization Problems Non-Scattering Solutions to Mass-Subcritical NLS*

Abstract. In this paper, we introduce two minimization problems on non-scattering solutions to nonlinear Schrödinger equation. One gives us a sharp scattering criterion, the other is concerned with minimal size of blowup profiles. We first reformulate several previous results in terms of these two minimizations. Then, the main result of the paper is existence of minimizers to the both minimization problems for mass-subcritical nonlinear Schrödinger equations. To consider the latter minimization, we consider the equation in a Fourier transform of generalized Morrey space. It turns out that the minimizer to the latter problem possesses a compactness property, which is so-called almost periodicity modulo symmetry.

----- **Hsi-Wei Shih** -----

Title: Local Well-Posedness for the Quantum Zakharov System in 1 D

Abstract: We consider the quantum Zakharov system in one spatial dimension. We prove the local well-posedness for initial data of the electric field and the deviation of the ion density lie in Sobolev space with certain regularities. As the quantum parameter approaches zero, we formally recover the result of Ginibre-Tsutsumi-Velo. We also improve the result of Ginibre-Tsutsumi-Velo for Zakharov system and the result of Jiang-Lin-Shao for quantum Zakharov system.

----- **Ru-Lin Kuan** -----

Title: *Strong unique continuation for two-dimensional elliptic systems with Gevrey coefficients*

Abstract: In this talk, we prove the strong unique continuation property (SUCP) for the general elliptic systems of two variables. We assume all the coefficients belong to Gevrey class and the characteristic roots of principal symbol are distinct. We reduce and transform the original systems to a diagonal but larger second order elliptic systems and prove SUCP by establishing appropriate Carleman estimates for this reduced system.

----- **Manas Kar** -----

Title: *Superconductive and Insulating Inclusions for Linear and Non-linear Conductivity Equations*

Abstract: We detect an inclusion with infinite conductivity from boundary measurements represented by the Dirichlet-to-Neumann map for the conductivity equation. We use both the enclosure method and the probe method. We use the enclosure method to also prove similar results when the underlying equation is the quasilinear p -Laplace equation. Further, we rigorously treat the forward problem for the partial differential equation $\operatorname{div}(\sigma |\nabla u|^{p-2} \nabla u) = 0$ where the measurable conductivity $\sigma : \mathbb{R}^3 \rightarrow [0, \infty]$ is zero or infinity in large sets and $1 < p < \infty$.

----- **Pu Zhao Kow** -----

Title:

Abstract:

Dec. 26, 2016

----- **Kazuo Aoki** -----

Title: *On the slip boundary conditions for the compressible Navier-Stokes equations*

Abstract: The slip boundary conditions for the compressible Navier-Stokes equations are one of the classical matters in kinetic theory and have been discussed in the literature. However, it is not easy to find the complete formulas that can be used immediately in practical applications. In the present talk, this topic is revisited, and the slip boundary conditions are derived in a complete form, together with the explicit values of the coefficients occurring in the formulas. Then, it is applied to the numerical computation of unsteady motion of a slightly rarefied gas caused by a plate oscillating in its normal direction. This is a joint work with M. Hattori, S. Kosuge, G. Martalo, and Luc Mieussens.

----- **Kung-Chien Wu** -----

Title: *Wave structures of the linearized 1D Landau equation*

Abstract: In this talk, I will show the pointwise behaviour of the linearized 1D Landau equation. The results reveal the particle and fluid aspects of the equation. The fluid-like waves reveal the dissipative behaviour of the type of the Navier-Stokes equation as usually seems by the Chapman-Enskog expansion, it represents the long time behaviour of the solution. The kinetic-like waves dominate the short time behavior, the smoothing effect of these waves come from the ellipticity in the velocity variable of the linearized collision operator and the transport part of the equation. This is a joint work with Haitao Wang.

----- **Hung-Wen Kuo** -----

Title: *Asymptotic Behavior for Rayleigh Problem Based on Kinetic Theory*

Abstract: We investigate the dynamics of the gas bounded by an infinite flat plate which is initially in equilibrium and set at some instant impulsively into uniform motion in its own plane. We show that the asymptotic behavior of the gas represents a perturbation to the free molecular gas when the time is much less than the mean free time. On the other hand, if the time is much greater than the mean free time, we show that the gas dynamics is governed by the linearized Navier-Stokes equation with a slip flow on the boundary and establish a boundary layer correction with thickness of the order of the mean free path.

----- **I-Kun Chen** -----

Title: *Regularity of stationary solutions to the linearized Boltzmann equations*

Abstract: We consider the regularity of solutions to the stationary linearized Boltzmann equations in bounded C^1 convex domains in \mathbb{R}^3 for gases with cutoff hard potential and cutoff Maxwellian gases. Suppose that a solution has a bounded weighted L^2 norm in space and velocity with the weight of collision frequency, which is a typical functional space for existence results for boundary value problems. We prove that this solution is Hölder continuous with order $(\frac{1}{2})^-$ away from the boundary provided the incoming data have the same regularity and uniformly bounded by a fixed function in velocity with finite weighted L^2 norm with the weight of collision frequency. A smoothing effect due to the combination of collision and transport is used in the proof.

----- **Jin-Cheng Jiang** -----

Title: *Estimates for the gain term of Boltzmann collision operator*

Abstract: We improve the regularity from $1 - \varepsilon$ to the sharp exponent 1 for the smoothing estimates of the gain term of the Boltzmann collision operator for the hard sphere model in \mathbb{R}^3 with full kernel. The same method can apply to the smoothing estimates of the gain terms for a large class of models.

----- **Masahiro Ikeda** -----

Title: *Sharp Lifespan Estimates and Blow-up Rates for the Semilinear Wave Equation with Time-Dependent Damping and Subcritical Nonlinearities*

Abstract: We study blow-up behavior of solutions for the Cauchy problem of the semilinear wave equation with time-dependent damping. When the damping is effective, and the nonlinearity is subcritical, we show the blow-up rates and the sharp lifespan estimates of solutions. Upper estimates are proved by an ODE argument, and lower estimates are given by a method of scaling variables.

----- **Jun-ichi Segata** -----

Title: *Scattering problem for the generalized Korteweg-de Vries equation*

Abstract: We consider the scattering problem for the generalized Korteweg-de Vries equation which is a generalization of notable Korteweg-de Vries equation. We construct a minimal non-scattering solution to the generalized Korteweg-de Vries equation in the mass sub-critical case.

----- **Kuan-Hsiang Wang** -----

Title: *Low Regularity Global Well-Posedness for the Quantum Zakharov System in 1D*

Abstract: In this paper, we consider the quantum Zakharov system in one spatial dimension. We prove the global well-posedness problem of the system with L^2 -Schrödinger data in energy space. As the quantum parameter tends to zero, we formally recover the result of Colliander-Holmer-Tzirakis.

----- **David Yang** -----

Title: *Computer Simulation and Decision*

Abstract: We discuss the war of two armies under some hypothesis. First we write down the simultaneous differential equations, and then we solve it. Next we observe the behavior of the solutions, and find out the discriminant of Victory or defeat.
