Himeji Conference on Partial Differential Equations
Titles and abstracts 2026

ITO, Kenichi (Kobe University)

Title: **Characterization of space-time singularities for the Schrödinger equation by initial state**

Abstract: We discuss spacetime singularities of a solution to the Schrödinger equation with a sublinear potential. The *quasi-homogeneous wave front set*, due to Lascar (1977), of a solution is characterized by a combination of classical high-energy scattering data and another new variant of the wave front set of the initial state. The proof consists of two parts. First we investigate the free solution by using explicit formulas and a special partition of unity. Second we compare the perturbed system with the free one, implementing an idea inspired from Nakamura (2009), which was originally devised for *spatial* singularities of the Schrödinger equation. The application of the idea is non-trivial since the time is no more a parameter, and takes a part in the base variables. This is a joint work with Takeru Fujii (the University of Tokyo).

ARITA, Shinichi (The University of Tokyo)

Title: **Rellich's theorem for Dirac equation with long-range perturbations**

Abstract: In this presentation, we will present a proof of Rellich's theorem for the Dirac equation with long-range potentials. While Rellich's theorem is well-established for the Schrödinger equation, this presentation applies the theorem to the Dirac equation. The talk will begin with the definition of the Dirac equation, followed by the definition of the Agmon-Hörmander space, which serves as the solution space. Finally, we will discuss the details of the proof. This talk is based on a joint work with Prof. Ito Kenichi (Kobe University).

KOKUBU, Kaito (Tokyo University of Science)

Title: **Classification of unstable travelling wave solutions to KdV type equations**

Abstract: We study travelling wave solutions to Korteweg–de Vries type equations which have double power nonlinearities with integer indices, such as the Gardner equation, and fractional dispersion. Whether these equations have ground state solutions depends on signatures of nonlinearities and parity combinations of the two indices. The aim of this study is to give the classification of phenomena of travelling wave solutions from the perspective of the signatures and parities of the indices. In this talk, we focus on unstable travelling wave solutions.

TERAMOTO, Yuka (Ehime University)

Title: **Asymptotic behavior of non-isothermal nematic liquid crystal flow**

Abstract: The non-isothermal model of compressible nematic liquid crystals in a 3-dimensional infinite layer is considered. Liquid crystals are in a state between solid and liquid, thus their flows are described by Navier-Stokes equations governing the fluid velocity and direction equation based on Oseen-Frank energy density functional governing the motion of orientation of rod-like particles. There are fewer results for non-isothermal model of nematic liquid crystal for global classical solutions compared to those of isothermal model. It seems physically consistent to consider thermally affected system in an infinite layer since the nematic liquid crystals are often used between some plates and the orientation of molecules changes by thermal or electrical effects. To study such a situation, we start with the global well-posedness of solutions near the motionless state with small initial perturbation.

NAKAMURA, Shu (Gakushuin University)

Title: **Topics on the continuum limit of discrete Schrödinger operators**

Abstract: We discuss various topics related to the continuous limit of discrete Schrödinger operators, including the definitions and their continuum limit of discrete Dirac operators, complex resonances for discrete Schrödinger operators, continuum limit of scattering, discrete pseudodifferential operators and their continuum limit.

RENNIE, Adam (University of Wollongong)

Title: **Spectral flow formulae for unitaries in 1+Schatten**

Abstract: We present new formulae for spectral flow of "Schatten" unitaries. The formulae take the form "integral of exact form" over the Banach-Lie group of such unitaries. There are some peculiar possibilities opened for spectral flow of self-adjoint Fredholm operators, as well as applications to Levinson's theorem in scattering theory.

Joint work with A. Alexander, A. Carey, G. Levitina.

KAKEHI, Tomoyuki (University of Tsukuba)

Title: **Snapshot problem for the Klein-Gordon equation on spheres**

Abstract: In this talk, we consider the snapshot problem for the Klein-Gordon equation on spheres. Unlike the snapshot problem for the modified wave equation on spheres, we need to take 3-snapshots and have to assume a certain compatibility condition for snapshot data in order to get a unique solution. Suppose that $u|_{t=0} = f_0,\ u|_{t=t_1} = f_1,\ u|_{t=t_2} = f_2$ are the snapshot data. Roughly speaking, one of our main results is that if t_1/t_2 is irrational and not a Liouville number, then there is a unique solution of the Klein-Gordon equation with the snapshot data f_0, f_1, f_2 satisfying a certain compatibility condition. This talk is based on a joint work with J. Christensen, F. Gonzalez and J. Wang.

MOTONAGA, Shoya (Ritsumeikan University)

Title: **Eigenfunctions of differential operators associated with dynamical systems near integral curves in finite time**

Abstract: In this talk, we consider first-order differential operators associated with continuous dynamical systems. Eigenfunctions of these operators provide Lyapunov functions and conserved quantities for the systems and make strong constraints for dynamics. From the viewpoint of dynamical systems theory, we describe some characterizations of eigenfunctions in the neighborhood of integral curves in finite time, with special emphasis on the existence of zero eigenfunctions, i.e., conserved quantities.

MACHIDA, Manabu (Kindai University)

Title: **Reduced inverse Born series and an iterative inversion for inverse problems**

Abstract: Inverse problems are solved by different methods. Optimization approaches iteratively minimize the distance between observed data and the solution to the forward problem. These methods often suffer from being trapped in a local minimum and from the computational cost of iteration. An alternative approach is to use perturbation theory. Perturbation of a coefficient of an equation can be determined from boundary values of the solution to the equation using the inverse Born series. Compared with the (first) Born approximation, the inverse Born series does not need linearization of nonlinear inverse problems (Moskow and Schotland, "Inverse Born series", in The Radon Transform (2019)). The inverse Born series obtains the solution to the inverse problem as an explicitly computable functional of the scattering data. This functional can be expressed in terms of the Green's function for the underlying partial differential equation. In this talk, I will show that many terms in the inverse Born series approximately cancel and a fast iterative scheme is obtained to compute the inverse Born series (Ishida and Machida, arXiv:2512.00423).

YONEYAMA, Taisuke (Kitasato University)

Title: **Strichartz estimates in Wiener amalgam spaces for harmonic potentials with time-decaying coefficients**

Abstract: In this talk, we study Strichartz estimates in Wiener amalgam spaces for Schrödinger equations with a harmonic potential whose coefficient decays in time. We begin by introducing basic properties of harmonic potentials with time-decaying coefficients and explaining the motivation for considering such models. We then briefly review Wiener amalgam spaces and their relevance to dispersive estimates. Finally, we present our main results on Strichartz estimates in this framework. This talk is based on joint work with Shun Takizawa (Tokyo University of Science).

WAKASUGI, Yuta (Hiroshima University)

Title: **Energy decay of solutions to wave equation with space-dependent effective damping localized near infinity**

Abstract: In this talk, we study the energy decay of solutions to the wave equation with space-dependent damping. In particular, we study the case where the coefficient of the damping term may vanish in a bounded region and is effective near infinity in the sense that the asymptotic behavior is similar to solutions to the corresponding parabolic equation. The main tool is the weighted energy method based on the previous studies by Nakao (2001), Ikehata (2003), and Sobajima-Wakasugi (2021).

Organized by : HIGUCHI, K., HIROTA, K., ITAKURA, K., KAMEOKA, K., MIKAMI, K., NAGAYASU, S., RICHARD, S., TADANO, Y., TAIRA, K., WATANABE, T., YOSHIDA, N.