Integrated Research on Complex Dynamics and its Related Fields

Conference

The following conference is hosted by RIMS (Research Institute of Mathematical Science) of Kyoto University and Graduate School of Human and Environmental Studies of Kyoto University.

Organizer Hiroki SUMI (Osaka Univ.)

Date: December 14, 2009 13:00– December 18, 2009 17:30

Place： Kyoto University Yoshida South Campus Building of Graduate School of Human and Environmental Studies B23 (underground floor) Yoshida Nihonmatsu-cho, Sakyo-ku, Kyoto City (City Bus stop: Kyodai Seimon Mae)

Program and Abstracts

December 14

13:00–14:00 Mitsuhiro Shishikura (Kyoto Univ.)
On a theorem of Gaofei Zhang on Siegel disks

Abstract: In a recent paper, Gaofei Zhang proved that for all rational maps, the boundary of a Siegel disk of bounded type is a Jordan curve. The core of the proof is his extension of M. Herman's theorem on uniform quasisymmetric conjugacy of real-analytic circle homeomorphisms. In the talk, we propose a simplification of the proof using conformal invariants.

14:15-15:15 Yi-Chiuan Chen (Academia Sinica, Taiwan)
Family of Julia sets as orbits of differential equations

Abstract: The Julia set of the quadratic map $f_\mu(z) = \mu z(1-z)$ for μ not belonging to the Mandelbrot set is hyperbolic, thus varies continuously. It follows that a continuous curve in the exterior of the Mandelbrot set induces a continuous family of Julia sets. We shall show that this family can be obtained explicitly by solving the initial value problem of a system of infinitely coupled differential equations. A key point is that the required initial values can be obtained from the anti-integrable limit $\mu \to \infty$. The system of infinitely coupled differential equations reduces to a finitely coupled one if we are only concerned with some invariant finite subset of the Julia set. Therefore, it can be employed to find periodic orbits as well. We conduct numerical approximations to the Julia sets when parameter μ is located at the Misiurewicz points with external angle 1/2, 1/6, or 5/12. We approximate these Julia sets by their invariant finite subsets that are in tegrated along the reciprocal of corresponding external rays of the Mandelbrot set starting from the anti-integrable limit $\mu = \infty$. When μ is at the Misiurewicz point of angle 1/128, a 98-period orbit of prescribed itinerary obtained by this method is presented, without having to find a root of a 2^{98}-degree polynomial. The Julia sets (or their subsets) obtained are independent of integral curves, but in order to make sure that the integral curves are contained in the exterior of the Mandelbrot set, we use the external rays of the Mandelbrot set as integral curves. (This is a joint work with T Kawahira, H-L Li, and J-M Yuan.)

15:35-16:05 Hiroki Takahashi (Kyoto Univ.)
On the size of the stochastic parameter set of the real quadratic family

16:20-17:20 Ryuji Abe
Markoff spectra, geodesics, palindromes

December 15

9:45-10:45 Koh Katagata (Ichinoseki National College of Tech.)
Siegel disks and wandering domains of transcendental entire functions

11:00-12:00 Weixiao Shen (National Univ. of Singapore) I.
Non-uniformly hyperbolicity assumptions: Large derivative vs backward contraction

13:45-14:45 Tomoki Kawahira (Nagoya Univ.)
Some new applications of Zalcman's lemma to complex dynamics

15:00-16:00 Hiroyuku Inou (Kyoto Univ.)
Extending local holomorphic conjugacies

Abstract: We prove that if two rational maps or entire maps have holomorphically conjugate polynomial-like restrictions, then we can extend the conjugacy globally as a correspondence.

16:15-17:15 Weixiao Shen (National Univ. of Singapore) II.
Construction of Young tower with tail estimates: backward shrinking and badness exponent

December 16

9:45-10:15 Shunsuke Morosawa (Kochi Univ.)
Siegel disks of transcendental entire functions and singular values

10:30-11:30 Weixiao Shen (National Univ. of Singapore) III.
Examples: Decay of correlation for Fibonacci-like unimodal interval maps

14:00-15:00 Kohei Ueno (Kyoto Univ.)
Weighted Green functions of polynomial skew products on $\mathbb{C}^2$

Abstract: Let f be a (non-degenerate) polynomial skew product on $\mathbb{C}^2$. We investigate the existence of the Green function of f, and introduce a generalized Green function that is well-behaved on $\mathbb{C}^2$. Moreover, we consider the dynamics of the extension of f to a holomorphic or rational map on a weighted projective space.

15:15-16:15 Shizuo Nakane (Tokyo Polytechnic Univ.)
Component-wise accumulation sets of critical sets for Axiom A polynomial skew products

16:30-17:30 Tomoko Shinohara (Tokyo Metropolitan College of Industrial Technology)
Local dynamical structure of indeterminacy points of rational mappings

18:00– Banquet

December 17

9:45-10:45 Hiroki Sumi (Osaka Univ.)
Cooperation principle in random complex dynamics and singular functions on the complex plane

Abstract: We investigate the random complex dynamics and the dynamics of semigroups of rational maps on the Riemann sphere. We see that in the random complex dynamics, the chaos easily disappears. We investigate the iteration of the transition operator M acting on the space of continuous functions on the Riemann sphere. It turns out that under certain conditions, each finite linear combination φ of unitary eigenvectors of M can be regarded as a complex analogue of the devil's staircase. By using ergodic theory and potential theory, we investigate the non-differentiability and the pointwise Hölder exponent of φ. The contents of this presentation are included in my preprint "Random complex dynamics and semigroups of holomorphic maps" which is available from my webpage or from http://arxiv.org/abs/0812.4483.

11:00-12:00 Taro Asuke (Univ. of Tokyo)
Comparing Julia sets

13:45-14:45 Tsuyoshi Kajiwara (Okayama Univ.)
C^*-algebras associated with complex dynamics

15:00-16:00 Yusuke Okuyama (Kyoto Institute of Technology)
Ergodic and potential theories in complex dynamics

16:15-17:15 Yutaka Ishii (Kyushu Univ.)
Description of Julia sets by using group actions

December 18

9:15-9:45 Jin Teisuke (Kyoto Institute of Techonology)
Dynamics of Hénon maps: Nevanlinna theory

10:00-11:00 Takato Uehara (Kyushu Univ.)
Construction of rational surface automorphisms with positive entropy

11:15-12:15 Katsunori Iwasaki (Kyushu Univ.)
Painlevé equations and complex dynamics

14:00-15:00 Shu Kawaguchi (Osaka Univ.)
Finiteness results on commuting maps over complex numbers and arithmetic complexity

15:15-16:15 De-Qi Zhang (National Univ. of Singapore)
Endomorphisms of projective varieties and their invariant hypersurfaces

Abstract. We give an optimal upper bound on the number of totally invariant hypersurfaces, in terms of the dimension and Picard number of the variety, and characterize the boundary case.

16:30-17:30 Keiji Oguiso (Osaka Univ.)

General singular fibers of proper holomorphic Lagrangian fibrations via foliation

Abstract: This is a joint work with Jun-Muk Hwang. We shall consider general singular fibers of proper holomorphic Lagrangian fibrations, via the vector fields and two kinds of natural twisted vector fields, both of which naturally arise from the Lagraingian property and tangent to the fibers. Integrating them, we shall give a fairly complete classification of the general singular fibers in terms of the 1-dimensional cycles called characteristic 1-cycles, which turn out to be the same (except one exception) as singular fibers of minimal elliptic surfaces given by Kodaira, that naturally cover the fibers under transitive additive group action. We also discuss about their multiplicities.

For the most recent version of the program and the abstract, please see the following web page:

http://www.math.sci.osaka-u.ac.jp/∼sumi/cpxdyn09meeting2e.html

Date: December 18, 2009.