Analysis and Geometry of Riemann Surfaces and Related Topics

21-23 June, 2013 Tokyo Institute of Technology

— Program —

21 June (Fri.) Main Building H213

14:00 - 15:00
Katsuhiko Matsuzaki (Waseda University)
The Chabauty and the Thurston topologies on a family of closed subsets

15:15 - 16:15
Ara Basmajian (The City University of New York, Waseda University)
Geodesics on hyperbolic surfaces

16:30 - 17:30
Hideki Miyachi (Osaka University)
Geometry of Teichmuller distance

22 June (Sat.) Main Building H111

10:00 - 11:00
Sudeb Mitra (The City University of New York)
Conformal naturality of some generalized Teichmuller spaces and applications

11:15 - 12:15
Ken'ichi Ohshika (Osaka University)
Geometric completion for deformation spaces of Kleinian groups

— lunch —

14:00 - 15:00
Dragomir Saric (The City University of New York)
The length spectrum metric on Teichmuller spaces of geometrically infinite surfaces

15:15 - 16:15
Mitsuhiro Shishikura (Kyoto University)
Satellite renormalization for complex quadratic polynomials

16:30 - 17:30
Hiroshige Shiga (Tokyo Institute of Technology)
On some analytic properties of deformation spaces of Kleinian groups

— banquet —

23 June (Sun.) Main Building H111

10:00 - 11:00
Toshiyuki Sugawa (Tohoku University)
Hyperbolic metric on Riemann surfaces with conical singularities

11:15 - 12:15
Yunping Jiang (The City University of New York)
Universal Holomorphic Motions in Motion Theory

— lunch —

14:00 - 15:00
Sadayoshi Kojima (Tokyo Institute of Technology)
Normalized entropy versus volume for pseudo-Anosovs

15:15 - 16:15
Hiroaki Aikawa (Hokkaido University)
Intrinsic ultracontractivity and the boundary Harnack principle
— A unified approach with capacitary width

— Abstract —

Katsuhiko Matsuzaki (Waseda University)
Title: The Chabauty and the Thurston topologies on a family of closed subsets

Abstract: For a regularly locally compact topological space X not necessarily Hausdorff, we define a map σ from X to the space $C(X)$ of all closed subsets of X by taking the closure of each point set of X. By providing the Thurston topology for $C(X)$, we see that σ is a topological embedding, and by taking the closure of $\sigma(X)$ with respect to the Chabauty topology, we have a Hausdorff compactification of X. As an application, we investigate a condition under which a homeomorphism between compact subsets of $C(X)$ with respect to the Chabauty topology is a homeomorphism in the Thurston topology. This is originated in a problem of asking whether a homeomorphism of the non-Hausdorff space of all geodesic laminations on a hyperbolic surface X in the Thurston topology is induced by a mapping class action.

Ara Basmajian (The City University of New York, Waseda University)
Title: Geodesics on hyperbolic surfaces

Abstract: The main focus of this talk will be on the relationship, in various contexts, between the length and intersection number of a closed geodesic on a hyperbolic surface. Let m be a hyperbolic structure on a surface S and γ the free homotopy class of a closed curve on S; denote the m-length of the closed geodesic in the homotopy class of γ by $L_\gamma(m)$. Specifically, we study the relationship between $L_\gamma(m)$ and the intersection number k of γ when,

1. m is a fixed hyperbolic structure and γ is any homotopy class with self-intersection k.

2. m varies in the Teichmüller (moduli) space of a surface, and γ is any homotopy class with self-intersection k.

3. m varies through all hyperbolic structures on all topological surfaces, and γ is any homotopy class with self-intersection k.

4. The homotopy class of γ is fixed on S and has self-intersection number k, but the hyperbolic structure m varies in the Teichmüller (moduli) space of S. The so-called length function of γ.

Hideki Miyachi (Osaka University)
Title: Geometry of Teichmuller distance

Abstract: In this talk, I will give a recent progress on extremal length geometry on Teichmuller space. Especially, I will discuss the Thurston theory with extremal length. I also talk about a rigidity theorem for a certain coarse mapping on Teichmuller space.

Sudeb Mitra (The City University of New York)
Title: Conformal naturality of some generalized Teichmuller spaces and applications

Abstract: We will discuss the conformal naturality of the Teichmuller space of a closed set in the Riemann sphere. A close analogue is the relationship between the universal Teichmuller space and the Teichmuller space of a Fuchsian group. We will then discuss Douady-Earle section for the Teichmuller space of a closed set in the sphere. Finally, we will discuss some applications in holomorphic motions and local quasiconformal motions. The last part of the talk is based on joint works with Shiga, with Jiang and Shiga, and an ongoing joint work with Jiang, Shiga, and Wang.

Ken'ichi Ohshika (Osaka University)
Title: Geometric completion for deformation spaces of Kleinian groups

Abstract: We consider a completion of deformation spaces of Kleinian groups with respect to the geometric topology. We shall show the phenomenon of bumping, which occurs in the algebraic topology, disappears in this completion. We shall also show that the mapping class group acts naturally on the geometric completion of a Bers slice, in contrast to its algebraic compactificaton on which the mapping class group cannot act.

Dragomir Saric (The City University of New York)
Title: The length spectrum metric on Teichmuller spaces of geometrically infinite surfaces

Abstract: The study of the (symmetric) length spectrum metric on infinite-dimensional Teichmuller spaces was initiated by Prof. Shiga. We give an overview of the known results on the length spectrum metric for infinite surfaces and discuss in more details some of them.

Mitsuhiro Shishikura (Kyoto University)
Title: Satellite renormalization for complex quadratic polynomials

Abstract: The renormalization has been one of the main focus of the theory of one-dimensional complex dynamics. It is connected to the conjectures of on the density of hyperbolicity and the local connectivity of the Mandelbrot set. For quadratic polynomials, there are two different types of renormalizations – primitive and satellite. The primitive renormalizations has been successfully studied by Kahn and Lyubich and now there are powerful a priori bounds. The satellite type has a very different nature and our knowledge is limited. In this talk, we discuss the difference between two types of renormalizations and explain recent results on the satellite renormalizations.

Hiroshige Shiga (Tokyo Institute of Technology)
Title: On some analytic properties of deformation spaces of Kleinian groups

Abstract: Let G be a non-elementary Kleinian group. We consider the space of quasiconformal deformations of G. The space has a natural complex structure and it is finite dimensional if G is finitely generated. In this talk, we consider complex analytic properties of the spaces, which are related to some results by Kra-Maskit and McMullen.

Toshiyuki Sugawa (Tohoku University)
Title: Hyperbolic metric on Riemann surfaces with conical singularities

Abstract: A complete conformal metric of constant curvature -4 on a Riemann surface with prescribed conical singularities is known to exist uniquely if the surface is of finite conformal type, if the number of the singularities is finite and if the extended Euler characteristic is negative. We will discuss existence and uniqueness of such a metric when the surface is of infinite conformal type. This is partly joint work with Daniela Kraus and Oliver Roth.

Yunping Jiang (The City University of New York)
Title: Universal Holomorphic Motions in Motion Theory

Abstract: In this talk, I will discuss some recent work jointly with Sudeb Mitra, Hiroshige Shiga, and Zhe Wang and with Frederick Gardiner on continuous motions, quasiconformal motions, local quasiconformal motions, and holomorphic motions. I will first mention two statements called lifting and canonical replacement which imply Slodkowski's Theorem through the study of universal holomorphic motions. Then I will discuss a counter-example which can be extended to a continuous motion but not a quasiconformal motion. This disproves a claim by Sullivan and Thurston in their 1986 paper. To fix this claim, we introduce a new concept called local quasiconformal motion. In Mitra's talk, he will discuss that the universal holomorphic motion is also a universal local quasiconformal motion. But the result I will discuss says that the universal holomorphic motion is not a universal quasiconformal motion. Therefore, our new concept is useful. Furthermore, I will show that a differentiable quasiconformal motion is a local quasiconformal motion. Finally, I will discuss a conjecture which says that a guiding quasiconformal motion is a local quasiconformal motion.

Sadayoshi Kojima (Tokyo Institute of Technology)
Title : Normalized entropy versus volume for pseudo-Anosovs

Abstract : We establish an explicit linear inequality between the normalized entropy of pseudo-Anosov automorphisms and the hyperbolic volume of their mapping tori, based on a recent result by Jean-Marc Schlenker on renormalized volume of quasi-Fuchsian manifolds.

Hiroaki Aikawa (Hokkaido University)

Title: Intrinsic ultracontractivity and the boundary Harnack principle
— A unified approach with capacitary width

Abstract: We study intrinsic ultracontractivity for the semigroup associated with Dirichlet heat kernel. We give a sharp sufficient condition for intrinsic ultracontractivity, valid for arbitrary domains, in terms of capacitary width of sublevel sets of the Green function and the ground state. This condition, together with the Harnack inequality, yields sufficient conditions for intrinsic ultracontractivity of nonsmooth domains. Our approach employs a parabolic box argument, a counterpart of the box argument for the boundary Harnack principle. It enables us to treat intrinsic ultracontractivity and the boundary Harnack principle in parallel.