

RIEMANN SURFACES AND DISCONTINUOUS GROUPS 2013

Osaka Univeristy, January 12-14, 2013

Organaizers: Hiroshige Shiga (Tokyo Institute of Technology)
Tamas Kalman (Tokyo Institute of Technology GE)
Kentaro Ito (Nagoya University)
Hideki Miyachi (Osaka University)

This is an annual conference on topics of Riemann surfaces and discontinuous groups, including geometric function theory, potential theory, Teichmuller theory and hyperbolic geometry. This conference is partially supported by the Global Edge Institute at Tokyo Tech and the "Program to Promote the Tenure Track System" (テニュアトラック普及・定着事業) of the Ministry of Education, Culture, Sports, Science & Technology (文部科学省), and Grant-in-Aid for Scientific Research (A) 22244005.

Venue : Graduate school of Science, Building E, Room E301 (Third floor)
Osaka University, Machikaneyama 1-1, Toyonaka, Osaka

INVITED SPEAKERS

Ege Fujikawa (Chiba University)
Yuki Iguchi (Tokyo Institute of Technology)
Yuichi Kabaya (Osaka University)
David Kalaj (University of Montenegro)
Eiko Kin (Osaka University)
Erina Kinjo (Tokyo Institute of Technology)
Hidetoshi Masai (Tokyo Institute of Technology)
Katsuhiko Matsuzaki (Waseda University)
Toshihiro Nogi (Osaka City University)
Kasra Rafi (University of Toronto)
Ken-ichi Sakan (Osaka City Univeristy)
Masaharu Tanabe (Tokyo Institute of Technology)
Masahiro Yanagishita (Waseda University)

PROGRAM

January 12 (Saturday).

- 13:30–14:20 Ege Fujikawa (Chiba University)
The order of periodic elements of the asymptotic Teichmüller modular group
- 14:30–15:20 Kasra Rafi (University of Toronto)
Geometry of Teichmüller space (part I)
- 15:40–16:30 Toshihiro Nogi (Osaka City University)
On extendibility of a map induced by Bers isomorphism
- 16:40–17:30 Eiko Kin (Osaka University)
Minimal dilatations of pseudo-Anosovs generated by the magic 3-manifold and their asymptotic behavior

January 13 (Sunday).

- 10:00–10:50 Yuichi Kabaya (Osaka University)
Parametrization of $\mathrm{PGL}(n, \mathbb{C})$ -representations of surface groups
- 11:00–11:50 Hidetoshi Masai (Tokyo Institute of Technology)
On commensurability of fibrations on a hyperbolic 3-manifold
- Lunch Break
- 13:30–14:20 Ken-ichi Sakan (Osaka City University)
Quasiconformal and Lipschitz harmonic mappings of the unit disk onto bounded convex domains
- 14:30–15:20 David Kalaj (University of Montenegro)
Energy-minimal diffeomorphisms between doubly connected Riemann surfaces
- 15:40–16:30 Erina Kinjo (Tokyo Institute of Technology)
On the length spectrum metric in infinite-dimensional Teichmüller spaces
- 16:40–17:30 Kasra Rafi (University of Toronto)
Geometry of Teichmüller space (part II)

January 14 (Monday).

- 10:00–10:50 Yuki Iguchi (Tokyo Institute of Technology)
On accumulation points of geodesics in Thurston's boundary of Teichmüller spaces
- 11:00–11:50 Masaharu Tanabe (Tokyo Institute of Technology)
On the combinatorial Hodge star operator and holomorphic cochains
- Lunch Break
- 13:30–14:20 Masahiro Yanagishita (Waseda University)
Teichmüller distance and Kobayashi distance on subspaces of the universal Teichmüller space
- 14:30–15:20 Katsuhiko Matsuzaki (Waseda University)
Circle diffeomorphisms and Teichmüller spaces

ABSTRACT

Ege Fujikawa.

Title. The order of periodic elements of the asymptotic Teichmüller modular group

Abstract. We give a sufficient condition for an asymptotic Teichmüller modular transformation to be of finite order. Furthermore, we estimate the order by using hyperbolic geometry.

Yuki Iguchi.

Title. On accumulation points of geodesics in Thurston's boundary of Teichmüller spaces

Abstract. In this talk, we detect accumulation points of arbitrary Teichmüller geodesic rays in Thurston's compactification of a Teichmüller space. We showed that accumulation points of a ray are written as a sum of measured foliations supported on the partitions of minimal decomposition of the vertical foliation associated with the ray. We also showed that there exists a boundary point to which no ray accumulates.

Yuichi Kabaya.

Title. Parametrization of $\mathrm{PGL}(n, \mathbb{C})$ -representations of surface groups

Abstract. Let S be a surface of genus g with n boundary components. The interior of S is ideally triangulated into $2(2g - 2 + n)$ ideal triangles. Fock and Goncharov gave a parametrization of (framed) $\mathrm{PGL}(n, \mathbb{C})$ -representations of the fundamental group of S by $(n-1)(n-2)/2$ parameters for each ideal triangle and $(n-1)$ parameters for each edge of the triangulation. In this talk, we will give a parametrization of $\mathrm{PGL}(n, \mathbb{C})$ -representations as an analogue of the Fenchel-Nielsen coordinates using the Fock-Goncharov coordinates. This is joint work with Xin Nie.

David Kalaj.

Title. Energy-minimal diffeomorphisms between doubly connected Riemann surfaces

Abstract. Let $N = (\Omega, \sigma)$ and $M = (\Omega^*, \rho)$ be doubly connected Riemann surfaces and assume that ρ is a smooth metric with bounded Gauss curvature \mathcal{K} and finite area. We establish the existence of homeomorphisms between Ω and Ω^* that minimize the Dirichlet energy. *Among all homeomorphisms $f: \Omega \rightarrow \Omega^*$ between doubly connected domains such that $\mathrm{Mod} \Omega \leq \mathrm{Mod} \Omega^*$ there exists, unique up to conformal automorphisms of Ω , an energy-minimal diffeomorphism which is a harmonic diffeomorphism. The results improve and extend some recent results of Iwaniec, Koh, Kovalev and Onninen (Inven. Math. (2011)). Further, the case of radial metrics is discussed in details.*

Eiko Kin.

Title. Minimal dilatations of pseudo-Anosovs generated by the magic 3-manifold and their asymptotic behavior

Abstract. Let $\delta_g > 1$ be the minimal dilatation of pseudo-Anosovs defined on a closed surface of genus g . Penner proved that $\log \delta_g$ behaves like $\frac{1}{g}$. We are interested in McMullen's question: Does $\lim_{g \rightarrow \infty} g \log \delta_g$ exist? What is its value? We examine his question in the large set $\widehat{\mathcal{M}}$ of pseudo-Anosovs on closed surfaces "generated by" the magic manifold N which is homeomorphic to the 3-chain link exterior. Let $\widehat{\delta}_g$ be the minimum among dilatations of elements in $\widehat{\mathcal{M}}$ defined on a closed surface of genus g . We prove that $\lim_{g \rightarrow \infty} g \log \widehat{\delta}_g = \log(\frac{3+\sqrt{5}}{2})$. Moreover for large g , $\widehat{\delta}_g$ is achieved by the monodromy of some Σ_g -bundle over the circle obtained from either $N(\frac{3}{-2})$ ($\simeq (-2, 3, 8)$ -pretzel link exterior) or $N(\frac{1}{-2})$ ($\simeq 6_2^2$ link exterior) by Dehn filling both cusps, where $N(r)$ is the manifold obtained from N by Dehn filling one cusp along the slope $r \in \mathbb{Q}$. This is a joint work with Sadayoshi Kojima and Mitsuhiro Takasawa.

Erina Kinjo.

Title. On the length spectrum metric in infinite-dimensional Teichmüller spaces

Abstract. We consider Teichmüller metric and the length spectrum metric in Teichmüller spaces. It is known that these metrics define the same topology in finite-dimensional Teichmüller spaces. In this talk, we study infinite-dimensional Teichmüller spaces where they define the same topology.

Hidetoshi Masai.

Title. On commensurability of fibrations on a hyperbolic 3-manifold

Abstract. We discuss the fibered commensurability of fibrations on a hyperbolic 3-manifold. The notion of fibered commensurability is defined by Calegari, Sun and Wang (2010). Calegari, Sun and Wang asked in their paper if there is a manifold with a pair of commensurable fibrations whose fibers are of different topology. In this talk we will construct an infinite sequence of manifolds with such pairs of fibrations. We further show that two fibrations of each pair belong to the same fibered face.

Katsuhiko Matsuzaki.

Title. Circle diffeomorphisms and Teichmüller spaces

Abstract. By characterizing a diffeomorphism of the circle with Hölder continuous derivative in terms of the quasiconformal Teichmüller theory, we show certain rigidity of groups of circle diffeomorphisms.

Toshihiro Nogi.

Title. On extendibility of a map induced by Bers isomorphism

Abstract. Let $T(S)$ be the Teichmüller space of a closed Riemann surface S of genus $g(> 1)$. Denote by U the universal covering surface of S , that is, the upper half-plane and denote by \dot{S} the surface obtained by removing a point from S . By the Bers isomorphism theorem, we have a homeomorphism of $T(S) \times U$ onto $T(\dot{S})$. The Bers embedding shows that the spaces $T(S) \times U$ and $T(\dot{S})$ are embedded in $(3g - 2)$ -dimensional complex vector space. Thus the boundaries of both spaces are naturally defined.

Let A be a subset of the boundary ∂U of U consisting of all points filling S . In this talk, we show that the homeomorphism of $T(S) \times U$ onto $T(\dot{S})$ has a continuous extension to $T(S) \times (U \cup A)$. This is a joint work with Hideki Miyachi (Osaka University).

Kasra Rafi.

Title. Geometry of Teichmüller space (part I and II).

Abstract. We review recent results about the Teichmüller space equipped with the Teichmüller metric. We give an inductive description of a Teichmüller geodesic using the Teichmüller geodesics of surfaces with lower complexity. We use these results to compare how the Teichmüller space is similar or different from the hyperbolic space.

Ken-ichi Sakan.

Title. Quasiconformal and Lipschitz harmonic mappings of the unit disk onto bounded convex domains

Abstract. For a sense-preserving univalent harmonic self-mapping F of the unit disk, Pavlović showed that F is quasiconformal iff F is bi-Lipschitz. He gave another characterization, too, for the quasiconformality of F by means of some properties of the boundary-valued mapping of F . If the target of F is a bounded convex domain, then this result does not hold in general as it stands. If the Lipschitz property of F is pre-assumed, however, then we could obtain a variant of the result by Pavlović. In other words, in this talk we show some characterizations of a quasiconformal and Lipschitz harmonic mapping of the unit disk onto a bounded convex domain. This is a joint work with Dariusz Partyka.

Masaharu Tanabe.

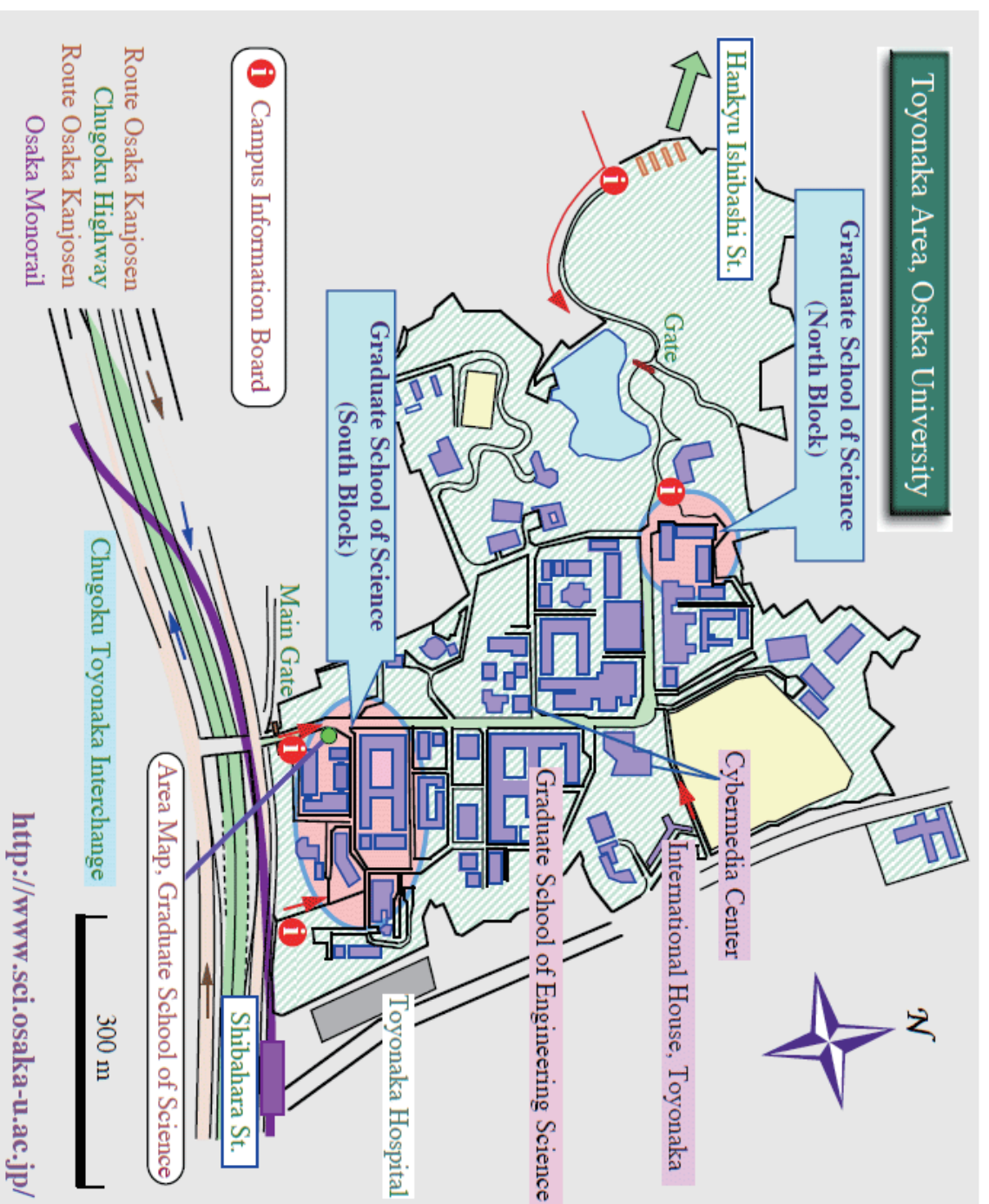
Title. On the combinatorial Hodge star operator and holomorphic cochains

Abstract. For cochains equipped with an inner product of a triangulated manifold, S.O. Wilson defined the combinatorial Hodge star operator \star in his paper of 2007 and showed that for a certain cochain inner product which he named the Whitney inner product, this operator converges to the smooth Hodge star operator if the manifold is Riemannian. He also stated that $\star\star \neq \pm \text{Id}$ in general and raised a question if $\star\star$ approaches $\pm \text{Id}$ as the mesh of the triangulation tends to zero. In this talk, we solve this problem affirmatively.

Masahiro Yanagishita.

Title. Teichmüller distance and Kobayashi distance on subspaces of the universal Teichmüller space

Abstract. It is known that the Teichmüller distance on the universal Teichmüller space T coincides with the Kobayashi distance. For a metric subspace of T having a comparable complex structure with that of T , we can similarly consider whether or not the Teichmüller distance on the subspace coincides with the Kobayashi distance. In this talk, we give a sufficient condition for metric subspaces under which the problem above has a affirmative answer. Moreover, we introduce an example of such subspaces.



Buildings in Toyonaka Area
www.sci.osaka-u.ac.jp

Liberal Arts and
Sciences Organization

Playground

Graduate School of Science

(North Block)

- ① Physics Building
- ② Chemistry Building
- ③ Natural Science Building

(South Block)

- A~H Main Buildings
- ④ Research Center for Molecular Thermodynamics
 - ⑤ Lepton Nuclear Spectroscopy Laboratory
 - ⑥ Laboratory of Nuclear Studies
 - ⑦ Van de Graaff Laboratory

Graduate School of Science
(North Block)

Ishibashi St.

Faculty of Language and Culture

Faculty of Law

Graduate School of Engineering Science

Cybermedia Center

International House and Foreign Student House

Sigma Hall

Lot Temperature Center

Research Center for Materials Science at Extreme Conditions

Cafeteria Raifore

Cafeteria & Shop

Post Office

Machikaneyama Kaikan Hall

Student Hall

Nakayama Pond

Graduate School of Science
(South Block)

i Campus Information Board

i Area Map, Graduate School of Science

N

Main Gate

Gatekeeper

Radioisotope Research Center

Pedestrian Walkway

Route Osaka Kanjo

Chugoku Highway

Route Osaka Kanjo

Shibahara St.

Osaka Monorail

100 m

