

Kyoto Dynamics Days 10

15 – 17 March, 2011

Department of Mathematics, Kyoto University
(Room 110, Building No. 3 of Faculty of Science)

– Program –

Tuesday, 15 March : 14:00–17:00

14:00–14:50 Ale Jan Homburg (University of Amsterdam, Netherland)
Atomic disintegrations for partially hyperbolic diffeomorphisms

15:05–15:55 Ken-ichiro Yamamoto (Tokyo Institute of Technology)
Topological entropy of divergence points for non-uniformly hyperbolic systems

16:10–17:00 Yong Moo Chung (Hiroshima University)
Large deviations on Markov towers

Wednesday, 16 March : 10:00–17:50

10:00–10:50 Hiroki Takahasi (Kyoto University)
Close to optimal induced systems for nonuniformly hyperbolic horseshoes at annihilating homoclinic bifurcations

11:05–11:55 Samuel Senti (Federal University of Rio de Janeiro, Brazil)
Thermodynamical formalism for maps with inducing schemes

13:30–14:20 Paulo Varandas (Federal University of Bahia, Brazil)
Robust exponential decay of correlations for singular flows

14:35–15:25 Naoya Sumi (Tokyo Institute of Technology)
Hausdorff dimension of saturated sets for non-uniformly hyperbolic dynamical systems

15:55–16:45 Masato Tsujii (Kyushu University)
Semi-classical zeta functions for negatively curved manifolds

17:00–17:50 Masayuki Asaoka (Kyoto University)
An application of the Margulis measure to deformation of group actions

Prof. Hayashi's talk is cancelled.

18:30– Dinner

Thursday, 17 March : 10:00–11:55

10:00– Free discussion

Prof. Senti's second talk is cancelled.

– Abstracts –

Tuesday, 15 March

Ale Jan Homburg (University of Amsterdam, Netherland)

Atomic disintegrations for partially hyperbolic diffeomorphisms

Shub & Wilkinson and Ruelle & Wilkinson studied a class of volume preserving diffeomorphisms on the three dimensional torus that are stably ergodic. The diffeomorphisms are partially hyperbolic and admit an invariant central foliation of circles. The foliation is not absolutely continuous, in fact, Ruelle & Wilkinson established that the disintegration of volume along central leaves is atomic. We show that in such a class of volume preserving diffeomorphisms the disintegration of volume along central leaves is a single delta measure.

Ken-ichiro Yamamoto (Tokyo Institute of Technology)

Topological entropy of divergence points for non-uniformly hyperbolic systems

We show that the set of divergence points (of Birkhoff average, empirical measure, etc.) has full topological entropy under some conditions in terms of Pesin theory. As an application, for diffeomorphisms derived from Anosov constructed by Mane, we show that the set of divergence points has full topological entropy.

Yong Moo Chung (Hiroshima University)

Large deviations on Markov towers

We give a sufficient condition to hold a full large deviation principle for Markov tower maps induced from return time functions. As an application of this result we show the large deviation principle of level 2 for some class of smooth dynamical systems with nonuniform hyperbolicity.

Wednesday, 16 March

Hiroki Takahasi (Kyoto University)

Close to optimal induced systems for nonuniformly hyperbolic horseshoes at annihilating homoclinic bifurcations

For a strongly dissipative Henon map at the first bifurcation parameter with a single orbit of tangency, we construct an induced system, as a first return map to a Cantor-like set called lattice. We show that this induced system is close to optimal, in that any ergodic measure which gives zero weight to the lattice has small entropy. This construction opens the way to a further development of an ergodic theory for this class of systems with critical behavior. Joint work with Samuel Senti (UFRJ).

Samuel Senti (Federal University of Rio de Janeiro, Brazil), I

Thermodynamical formalism for maps with inducing schemes

Inducing schemes are an important tool used to construct absolutely continuous invariant probabilities for interval maps through the definition of a uniformly expanding induced map. Such induced maps are semi-conjugate to the full shift on a countable alphabet. We show how this can be exploited in order to obtain the existence and uniqueness of equilibrium measures, i.e. measures which maximize the free energy - the sum of the entropy and the integral of a given potential function - over all (liftable) invariant probabilities for a given class of potential functions. In particular cases one can show that the potential functions $-t \log |Df|$ belong to this class and thus prove the existence of unique SRB and maximal entropy measures.

Paulo Varandas (Federal University of Bahia, Brazil)

Robust exponential decay of correlations for singular flows

We construct open sets of C^k ($k \geq 2$) vector fields with singularities that have robust exponential decay of correlations and satisfy the central limit theorem with respect to the unique physical measure. In particular we prove that the C^2 geometric Lorenz attractor has exponential decay of correlations with respect to the unique physical measure. This is a joint work with V. Araujo (UFRJ).

Naoya Sumi (Tokyo Institute of Technology)

Hausdorff dimension of saturated sets for non-uniformly hyperbolic dynamical systems

In this talk we consider the Hausdorff dimension of saturated sets for non-uniformly hyperbolic dynamical systems. In particular, we deal with the following two dynamics:

(1) Diffeomorphisms having isolated sets with dominated splitting, (2) Pseudo-Anosov diffeomorphisms. For these two systems we obtain some lower and upper bounds on the Hausdorff dimension of some saturated sets in terms of the Lyapunov exponents and the entropy. Our results are closely related to the multifractal analysis of Birkhoff averages of continuous functions.

Masato Tsujii (Kyushu University)

Semi-classical zeta functions for negatively curved manifolds

We consider the so-called semi-classical (or Gutzwiller-Voros) zeta function defined for geodesic flows on negatively curved manifolds. Such zeta function coincides with the Selberg zeta function when the underlying manifold is a hyperbolic surface (up to translation by one half) and its zeros are described completely, in the classical theorem by Selberg, in terms of the eigenvalues of the Laplacian on the underlying manifold. We discuss how such result can be extended to the variable curvature case by using the method using transfer operators.

Shuhei Hayashi (University of Tokyo)

A C^2 generic obstruction to hyperbolicity for diffeomorphisms with dominated splittings

We consider C^2 diffeomorphisms admitting homogeneous dominated splittings over the closures of periodic saddles with some index and having countable decompositions by basic sets of the closures of periodic saddles with indices different from the index above. Then, zero-Lyapunov exponents for some ergodic measures or pseudo-heterodimensional cycles are obstructions to the uniform hyperbolicity (Axiom A with no-cycles).

Thursday, 17 March

Masayuki Asaoka (Kyoto University)

An application of the Margulis measure to deformation of group actions

The subgroup of $SL(2, \mathbb{R})$ consisting of upper triangular matrices acts naturally on the quotient of $SL(2, \mathbb{R})$ by a cocompact lattice. The existence of non-classical deformation was open for almost thirty years. We construct a complete deformation by using the Margulis measure of the Anosov geodesic flow. As a corollary, non-classical deformation exists when the quotient is not a rational homology sphere.

Samuel Senti (Federal University of Rio de Janeiro, Brazil), II

Lifting measures to inducing schemes

Inducing schemes are used in dynamical systems in order to find a symbolic coding of a subset of the phase space. The induced map – defined on each element of the inducing scheme as an iterate of the original map on – is conjugated to the full symbolic shift on a countable alphabet. Although certain ergodic properties of the full shift carry over to original map, there is no one to one correspondence between invariant probabilities of the shift and those of the original map. The liftability problem consists in studying which measures have shift invariant counterparts. We study the problem for piecewise continuous maps of compact metric spaces. Time permitting we will present some ideas towards dealing with the higher dimensional cases.

This workshop is supported by

- Kyoto University Global COE Program “Fostering top leaders in Mathematics – broadening the core and exploring new ground”
- Grant-in-Aid for Scientific Research (B)21340035, (B)22340033.

(Last modified : 15 Mar. 2011)