第一部分 系列短课程

时间： 2022 年 8 月 22 日- 8 月 25 日
地点：腾讯会议 877-7065-5162 密码： 822831

主讲人：蒋云平(纽约城市大学)
时间：8月22日- 8月25日，上午 8:30-9:25
地点：腾讯会议 877-7065-5162 密码： 822831
题目：Transfer Operators with Dini Continuous Potentials
摘要：In this lecture, I will first talk about a counting problem in dynamical systems and an application of the Perron-Frobenius Theorem on positive matrices to calculate the asymptotical growth rate of periodic points for a dynamical system. To study the asymptotical growth rate of periodic points with Hölder continuous weights, we need to apply Ruelle's Perron-Frobenius theorem on positive transfer operators with Hölder continuous potentials. I will give proof of Ruelle's Perron-Frobenius theorem. Our proof differs from the traditional one, which uses the Lasota-Yorke inequality to find a convex compact subset. Our proof will not involve the Lasota-Yorke inequality. Therefore, we can extend it to proof for a generalization of Ruelle's Perron-Frobenius theorem with Dini continuous potentials. I will explain how to extend from the Hölder continuous case to the Dini continuous case. After the generalization of Ruelle's Perron-Frobenius theorem with Dini continuous potentials, I will give proof of the existence and uniqueness of the Gibbs measure associated with a Dini continuous potential by using some standard techniques in probability theory. If the time permits, I will continue to talk about the geometric Gibbs theory. The space of geometric Gibbs measures is the completion of the space of Gibbs measures under a certain hyperbolic metric. A geometric Gibbs measure is for a certain continuous potential. I will lecture on the proof of existence and uniqueness of a geometric Gibbs measure for a given certain continuous potential. I will also prove the ergodicity of a geometric Gibbs measure under some conditions. Finally, I will construct a complex manifold structure on the space of geometric Gibbs measures, making the space of geometric Gibbs measures a complete hyperbolic complex Banach manifold.

主讲人：胡虎翼(密歇根州立大学)
时间：8月22日-8月25日，上午 9:30-10:25
地点：腾讯会议 877-7065-5162 密码： 822831
题目：Introduction to Transfer Operators
摘要：Transfer operators are the most powerful tools to study existence of invariant measures and their statistical properties for dynamical systems. We first give two kinds of definitions of transfer operators 2 and discuss the relations. Then we introduce the Perron-Frobenius-Ruelle theorem, and Lasota-Yorke inequality, and the corresponding spectrum theory. We will also provide a counterpart of the spectral decomposition for nonwangdering set of an Axiom A system if Lasota-Yorke inequality is satisfied. Finally, we will try to introduce transfer operators on hyperbolic systems in which the space of generalized functions are used.

主讲人：孙文祥(北京大学)
时间：8月22日-8月25日，下午 14:00-14:55
地点：腾讯会议 877-7065-5162 密码： 822831
题目：On the Proof of Multiplicative Ergodic Theorem
摘要：Multiplicative Ergodic Theorem (MET) is one of the fundamental theorem in smooth ergodic theory. This theorem implies the existence of Lyapunov exponents along all tangent vectors at almost every point of the phase space. All the important results in smooth ergodic theory employ, explicitly or implicitly, the Multiplicative Ergodic Theorem. Due to such importance, there have been more than ten versions of the proof for MET, which are different from each other in contents and formulas. Yet the core of these versions are all the same, that is, the existence of Lyapunov exponents. It would be beneficial for us to understand a self-contained proof of MET in the study of smooth ergodic theory, since many crucial techniques are usually conceived from the proof of important theorems. In this minicourse, I shall explain a detailed and self-contained proof of the Multiplicative Ergodic Theorem.

主讲人：甘少波(北京大学)

时间：8月22日- 8月25日，下午 15:00-15:55

地点：腾讯会议 877-7065-5162 密码： 822831

题目：Hartman Theorem and Stable Manifold Theorem

摘要：In this minicourse, we shall discuss: Hartman theorem and the structural stability of hyperbolic toral automorphisms; the definition and examples of the hyperbolic set; the properties of hyperbolic sets and the pseudo-orbit tracing; the stable manifold theorem for hyperbolic sets; the invariant section theorem.