

Workshop on Dynamical Systems and Related Issues

This workshop will be held on Dec. 31, 2020 and hosted by the group of Ordinary Differential Equations and Dynamical Systems, Shanghai Jiao Tong University. The aim of this workshop is to bring together experts working on differential equations, dynamical systems and its applications to discuss recent progress.

Sponsor

School of Mathematical Sciences, Shanghai Jiao Tong University

Organizing Committee

Xianfeng Chen, Yilei Tang, Kaizhi Wang, Xiaodong Wang,

Dongmei Xiao, Jiang Yu, Xiang Zhang, Cheng Zheng

Schedule

Date: Dec. 31 Venue: Room 703, N0.6 Science Buildings, SJTU	
9:25-9:30	Opening Ceremony
Morning Session	Chair: Xiang Zhang (张祥, 上海交通大学)
9:30-10:00	Hongjin He (何鸿锦, 上海交通大学)
10:00-10:30	Qi Qiao (乔琪, 上海交通大学)
10:30-11:00	Peixing Yang (杨佩星, 上海交通大学)
Afternoon Session 1	Chair: Jiang Yu (于江, 上海交通大学)
14:00-14:30	Yilei Tang (唐异垒, 上海交通大学)
14:30-15:00	Kaizhi Wang (王楷植, 上海交通大学)
15:00-15:30	Xiaodong Wang (王晓东, 上海交通大学)
15:30-16:00	Cheng Zheng (郑骋, 上海交通大学)
Afternoon Session 2	Chair: Dongmei Xiao (肖冬梅, 上海交通大学)
16:00-17:00	Plenary Speaker: Weixiao Shen (沈维孝, 复旦大学&上海数学中心)

Title and Abstract

The number of limit cycles bifurcating from the period annulus of quasi-homogeneous Hamiltonian systems at any order

何鸿锦

SJTU

Abstract: Arnold-Hilbert 's 16th problem is an essential problem in bifurcation theory. In this report, we introduce our new results on Arnold-Hilbert' s 16th problem for quasi-homogeneous polynomial Hamiltonian systems. Firstly, a necessary and sufficient condition is given for quasi-homogeneous polynomial Hamiltonian systems having a center. Then it is shown that there exists a bound on the number of limit cycles bifurcating from the period annulus of quasi-homogeneous Hamiltonian systems at any order of Melnikov functions, and the explicit expression of this bound is given in terms of (n, k, s_1, s_2) , where n is the degree of perturbation polynomials, k is the order of the first nonzero higher order Melnikov function, and (s_1, s_2) is the weight exponent of quasi-homogeneous Hamiltonian with center. In the final, we show an example of calculation of high order Melnikov functions.

The dynamics of traveling waves for a nonlinear Belousov-Zhabotinskii system

乔琪

SJTU

Abstract: In this talk, we consider the existence of traveling wave fronts in a Belousov-Zhabotinskii system with delay. By applying geometric singular perturbation theory, we construct a locally invariant manifold for the associated traveling wave equation and obtain the traveling wave fronts for the equation by using the Fredholm orthogonality. Finally, we discuss the asymptotic behaviors of traveling wave solutions by applying the asymptotic theory.

Weierstrass 型函数图像的分形性质

沈维孝

复旦大学 & 上海数学中心

Abstract: Weierstrass 处处不可微连续函数的图像是分形几何的经典研究对象之一。我们将回顾这些函数图像的研究历史，并介绍近期如下二分性定理（与任浩杰合作）的证明:假设 b 是大于 1 的整数, f 是周期的解析函数, $0 < t < 1$. 那么要么函数 $W(x) = \sum_{n=0}^{\infty} b^{-nt} f(b^n x)$ 是解析函数, 要么其图像的 Hausdorff 维数等于 $2-t$.

Dynamics and bifurcations of some differential systems

唐异垒

SJTU

Abstract: In this talk I first introduce bifurcations and unfoldings of some planar differential systems at fully degenerate equilibria and display all bifurcations near the degenerate equilibria within the family of systems. Moreover, I present some new results for the limit cycles of smooth and piecewise smooth Lienard differential systems, which can be used for researching global dynamics and bifurcation of some biological and oscillator models.

Weak KAM theory and its applications

王楷植

SJTU

First, I will give a short introduction of classical weak KAM theory for Hamiltonian systems. Then I will talk about recent developments of the weak KAM theory for contact Hamiltonian systems, and applications of the weak KAM theory to mean field games. This talk is based on joint work with Piermarco Cannarsa, Wei Cheng, Cristian Mendico, Lin Wang and Jun Yan.

Ergodic measure space of geometric Lorenz attractors

王晓东

SJTU

Abstract: In this talk, we study the space of ergodic measures of geometric Lorenz attractors. We show that C^r -generically ($r \geq 2$), periodic measures are dense and hence the ergodic measure space is path-connected, while C^r -densely, the singular measure is isolated in the ergodic measure space. Similar property holds for C^1 singular hyperbolic attractors. We also explore the intermediate entropy property and finiteness of physical measures for star vector fields, in particular for singular hyperbolic attractors.

The number of limit cycles from a cubic center by the Melnikov function of any order

杨佩星

SJTU

Abstract: In this talk, we consider the maximum number of limit cycles bifurcating from a cubic center by using the Melnikov function of any order. And we prove that the upper bound for the number of limit cycles is 3 and reached.

Dynamical properties of unipotent flows and Diophantine approximation

郑阳

SJTU

Abstract: We will give an introduction to homogeneous dynamics and briefly review some aspects of this subject, exhibiting their connections to Diophantine approximation. Then we will discuss a joint work with C.D. Buenger about non-divergence of unipotent flows on infinite-volume homogeneous spaces, which extends a result of Kleinbock and Margulis.