

微分几何青年研讨会（线上）

2020年12月26日-27日

上海数学中心



上海数学中心

SHANGHAI CENTER FOR
MATHEMATICAL SCIENCES

微分几何青年研讨会 (ONLINE)

时间: 2020年12月26日-27日

腾讯会议 ID:

12月26日会议 ID: 219 511 853

12月27日会议 ID: 724 594 155

报告人:

陈学长	南京大学
葛建全	北京师范大学
刘 钢	华东师范大学
王 兵	中国科学技术大学
王 鹏	福建师范大学
王作勤	中国科学技术大学
吴云辉	清华大学
夏 超	厦门大学
彦文娇	北京师范大学
杨晓奎	清华大学
张振雷	首都师范大学
周 斌	北京大学

组织者: 丁 琪 上海数学中心; 吴鹏 上海数学中心

联系人: 赵晓婷 zhaoxiaoting@fudan.edu.cn

微分几何青年研讨会（线上）日程安排

日期	时间	报告人	主持人	腾讯会议 ID
12月26日 (周六)	9: 00- 9: 55	张振雷	忻元龙	219 511 853
	10: 00-10: 55	葛建全		
	11: 00-11: 55	王 兵	丁 琪	
	Break			
	14: 00-14: 55	夏 超	丁 琪	
	15: 00-15: 55	彦文娇	来米加	
	16: 00-16: 55	王 鹏		
12月27日 (周日)	9: 00- 9: 55	刘 钢	华波波	724 594 155
	10: 00-10: 55	周 斌		
	11: 00-11: 55	杨晓奎	吴 鹏	
	Break			
	14: 00-14: 55	吴云辉	吴 鹏	
	15: 00-15: 55	陈学长	杨 翎	
	16: 00-16: 55	王作勤		

Titles and Abstracts

12月26日周六

张振雷 首都师范大学 周六 9: 00-9: 55

Title: Continuity method to AMMP

Abstract: It is a survey talk to the analytic minimal model program through a continuity method which is proposed by La Nave and Tian.

葛建全 北京师范大学 周六 10: 00-10: 55

Title: Integral-Einstein hypersurfaces in unit spheres

Abstract: We introduce a new notion, integral-Einstein submanifolds in unit spheres, which generalizes pointwise Einstein to that in the integral sense. From Lawson's work, we know that rather rare hypersurfaces in unit spheres are Einstein, excluding those isoparametric hypersurfaces with $g > 2$ distinct principal curvatures which turn out to be integral-Einstein. Some geometric inequalities and rigidity results will be deduced as byproducts.

王兵 中国科技大学 周六 11: 00-11: 55

Title: Rigidity of first Betti number via Ricci flow smoothing

Abstract: The Colding-Gromov gap theorem asserts that an almost non-negatively Ricci curved manifold with unit diameter and maximal first Betti number is homeomorphic to the flat torus. In this talk, we will report a parametrized version of this theorem, in the context of collapsing Riemannian manifolds with Ricci curvature bounded below: if a closed manifold with Ricci curvature uniformly bounded below is Gromov-Hausdorff close to a (lower dimensional) manifold with bounded geometry, and has the difference of their first Betti numbers equal to the dimensional difference, then it is diffeomorphic to a torus bundle over the one with bounded geometry. We rely on two novel technical tools: the first is an effective control of the spreading of minimal geodesics with initial data parallel transported along a short geodesic segment, and the second is a Ricci flow smoothing result for certain collapsing initial data with Ricci curvature bounded below. This is a joint work with Shaosai Huang.

夏超 厦门大学 周六 14: 00-14: 55

Title: Anisotropic \mathcal{L}^p -capacity and anisotropic Minkowski inequality

Abstract: In this talk, we introduce our recent work on an anisotropic \mathcal{L}^p Minkowski inequality, which is a sharp inequality between the total \mathcal{L}^p anisotropic mean curvature and the anisotropic \mathcal{L}^p -capacity, for any bounded domains with smooth boundary in the Euclidean space. As \mathcal{L}^p tends to \mathcal{L}^1 , we

obtain the anisotropic Minkowski inequality between the total anisotropic mean curvature and the anisotropic perimeter, for outward \mathbb{F} -minimizing sets. For the proof, we follow the idea of Agostiniani-Fogagnolo-Mazzieri to establish a monotonicity for an integral quantity on the anisotropic \mathbb{F} -capacitary potential. This is based on a joint work with Dr. Jiabin Yin.

彦文娇 北京师范大学 周六 15: 00-15: 55

Title: Extrinsic geometry of the Gromoll-Meyer sphere

Abstract: Among a family of 2-parameter left invariant metrics on $\mathrm{Sp}(2)$, we determine which have nonnegative sectional curvatures and which are Einstein. On the quotient $N 11 = (\mathrm{Sp}(2) \times S^4)/S^3$, we construct a homogeneous isoparametric foliation with isoparametric hypersurfaces diffeomorphic to $\mathrm{Sp}(2)$. Furthermore, on the quotient $N 11/S^3$, we construct a transnormal system with transnormal 7 hypersurfaces diffeomorphic to the Gromoll-Meyer sphere Σ . Moreover, the induced metric on each hypersurface has positive Ricci curvature and quasi-positive sectional curvature simultaneously. This talk is based on a joint work with Prof. Zizhou Tang and Prof. Chao Qian.

王鹏 福建师范大学 周六 16: 00-16: 55

Title: Willmore Stability of the Lawson minimal surfaces $\xi_{g,1}$

Abstract: The generalized Willmore conjecture, proposed by Rob Kusner, states that the Lawson minimal surface $\xi_{g,1}$ minimizes Willmore energy among all closed surfaces of genus $g > 1$. So far there are very few progress on this conjecture. A natural idea is to consider the Willmore stability of them. In this talk we will show that they are strictly Willmore stable both in S^3 and in S^n via $S^3 \subset S^n$, based on a joint with Prof. Kusner.

12月27日周日

刘钢 华东师范大学 周日 9: 00-9: 55

Title: Dimension estimate of polynomial growth holomorphic functions on Kahler manifolds

Abstract: Let M be a complete noncompact Kahler manifold of nonnegative Ricci curvature and maximal volume growth, we give an estimate of polynomial growth holomorphic functions which is sharp in power.

周斌 北京大学 周日 10: 00-10: 55

Title: Solvability of a class of singular fourth order equations of Monge-Ampere type

Abstract: We study the solvability of the second boundary value problem for a class of highly singular fourth order equations of Monge-Ampere type. They arise in the

approximation of convex functionals subject to a convexity constraint using Abreu type equations. Both the Legendre transform and partial Legendre transform are used in our analysis. In two dimensions, we establish global solutions to the second boundary value problem for highly singular Abreu equations where the right hand sides are of q -Laplacian type for all $q > 1$. We show that minimizers of variational problems with a convexity constraint in two dimensions that arise from the Rochet-Chone model in the monopolist's problem in economics with q -power cost can be approximated in the uniform norm by solutions of the Abreu equation for a full range of q .

杨晓奎 清华大学 周日 11: 00-11: 55

Title: The geometry and topology of manifolds with RC-positive curvature

Abstract: In this presentation, we discuss the geometry and topology of compact Kahler manifolds with RC-positive tangent bundle, and describe the relationship between RC-positivity and rational connectedness in algebraic geometry.

吴云辉 清华大学 周日 14: 00-14: 55

Title: Optimal lower bounds for first eigenvalues of Riemann surfaces for large genus

Abstract: In this article we study the first eigenvalues of closed hyperbolic surfaces for large genus. We show that for every closed hyperbolic surface X_g of genus g ($g \geq 2$), the first eigenvalue of X_g is greater than $\frac{L_1(X_g)}{g^2}$ up to a uniform positive constant multiplication. Where $L_1(X_g)$ is the shortest length of simple closed multi-geodesics separating X_g . Moreover, we also show that this new lower bound is optimal as $g \rightarrow \infty$. This is a joint work with Yuhao Xue.

陈学长 南京大学 周日 15: 00-15: 55

Title: Gaussian curvature flow on S^2 for sign-changing curvature candidates

Abstract: We introduce a Gaussian curvature flow to study the Nirenberg problem. In comparison to Struwe's flow, it seems more suitable to sign-changing candidates. Precisely, let f be smooth and positive somewhere on S^2 . Assume that $|\nabla f|_{S^2}^{2+(\Delta_{S^2} f) \neq 0} > 0$ and the difference between the number of maxima of f and the number of saddle points of f with positive values and negative Laplacian is not equal to 1, then there exists at least a conformal metric of the round metric having f as its Gaussian curvature. This is joint with Mingxiang Li, Zirui Li and Professor Xingwang Xu.

王作勤 中国科学技术大学 周日 16: 00-16: 55

Title: Equivariant spectral invariants under non-abelian compact Lie group action

Abstract: Given a G -invariant elliptic pseudo-differential operator on a compact

Riemannian G -manifold M , we study its equivariant spectral invariants. I will explain the role of symplectic geometry in studying the G -equivariant spectrum. In particular, I will show how to apply symplectic techniques to study inverse spectral problems for Schrodinger operators in this setting, the main tool being a generalized Legendre relation which generalize our "generalized Legendre transform" in our previous work concerning abelian group actions. This is a joint work with V. Guillemin.