

Summer Workshop on Geometric Analysis

Department of Mathematics & IMS, Nanjing University

2021 年 6 月 24 日 - 6 月 27 日

一、会议时间与地点:

- 2021 年 6 月 24 日, 参会人员直接去酒店办理入住; 晚餐: 南京大学南苑餐厅 (18:00 开始)。
- 2021 年 6 月 25 日-6 月 26 日, 会议学术报告。
- 2021 年 6 月 27 日, 上午 自由讨论; 下午 离会。

会议地点: 南京大学鼓楼校区 (汉口路 22 号) 现代数学研究所蒙民伟楼 11 楼 1105 室。

二、住宿与交通:

住宿: 南京市中山路 251 号, 新纪元大酒店 A 座

交通方式:

- 飞机抵达。南京禄口机场离新纪元大酒店约 43 公里, 1 小时车程, 打车超过 200 元。也可以地铁前往酒店: 禄口机场站乘坐地铁 S1 号线至南京南站, 换乘地铁 1 号线至珠江路站 (1 号口或 3 号口出站), 步行 350 米抵达新纪元酒店, 全程约 1.5 小时。
- 高铁抵达。绝大多数高铁会抵达南京南站, 建议地铁前往酒店: 南京南站乘坐地铁 1 号线至珠江路站 (1 号口或 3 号口出站), 步行 350 米抵达酒店, 全程约半小时, 若坐出租车前往也需要半小时, 堵车风险较高。
- 火车抵达。少数高铁、动车会抵达南京站, 建议地铁前往酒店: 南京站乘坐地铁 1 号线至珠江路站 (1 号口或 3 号口出站), 步行 350 米抵达酒店, 全程约 25 分钟, 若坐出租车前往需要 20 分钟左右, 遇高峰期有堵车风险。

三、报告日程安排:

	6 月 25 日	6 月 26 日
9:00-9:50	王 鹏	简旺键
10:00-10:50	许小卫	张科伟
11:00-11:30	茶歇	茶歇
11:30-12:20	张世金	郑 恺
12:20-14:30	午餐 (南苑)	午餐 (南苑)
14:30-15:20	沈伟明	孙林林
15:30-16:20	韦 韡	王 越
16:30-17:00	茶歇	茶歇
17:00-17:50	吴 楠	张世红
18:00-	晚餐 (新纪元)	晚餐 (南苑)

四、报告题目与摘要：(按姓氏拼音排序)

- (1) 简旺键 (中科院数学所)

Title: Diameter and Ricci curvature estimates for the collapsing long-time solution of the Kahler-Ricci flow

Abstract: We will first briefly recall the background of the Kahler-Ricci flow. Then we will introduce the set-up of collapsing long-time solution of the Kahler-Ricci flow, and recall some previous results. Next, we show how to reprove Tian-Zhang's relative volume comparison estimate by using recent progress by Bamler. Then we will show that this approach is also useful in long-time solution of the Kahler-Ricci flow without Ricci curvature bound assumption. Finally, if time permits, we will show how to apply iteration process to obtain the local Ricci bound if the Kodaira dim of the manifold is one.

- (2) 沈伟明 (首都师范大学)

Title: Blow up sets of Ricci curvatures of complete conformal metrics

Abstract: A version of the singular Yamabe problem in bounded domains yields complete conformal metrics with negative constant scalar curvatures. In this talk, we will talk about blow-up phenomena of Ricci curvatures of these metrics on domains whose boundary is close to certain limit set of a lower dimension. We will characterize the blow-up set according to the Yamabe invariant of the underlying manifold. In particular, we will prove that all points in the lower dimension part of the limit set belong to the blow-up set on manifolds not conformally equivalent to the standard sphere and that all but one point in the lower dimension part of the limit set belong to the blow-up set on manifolds conformally equivalent to the standard sphere. We will demonstrate by examples that these results are optimal.

- (3) 孙林林 (武汉大学)

Title: Rigidity results of CSL submanifolds in the unit sphere

Abstract: I will talk about the rigidity of contact stationary Legendrian (CSL) submanifolds in the unit sphere based on the joint works with Prof. Luo Yong and Dr. Yin Jiabin. We prove some optimal rigidity results of closed CSL submanifolds and obtain a new characterization of the minimal Calabi torus in the unit sphere.

- (4) 王 鹏 (福建师范大学)

Title: Willmore stability and Morse index of minimal surfaces in spheres

Abstract: Urbano's index Theorem on Clifford torus plays an important role in Marques and Neves's proof of Willmore conjecture in S^3 . We generalize Urbano Theorem to minimal tori in S^4 by showing that a minimal torus in S^4 has index at least 6 and the equality holds if and only if it is the Clifford torus. It is also natural to ask whether the Clifford torus is Willmore stable when the co-dimension increases and whether there are other Willmore stable tori or not. We answer these problems for minimal tori in S^n , by showing that the Clifford torus in S^3 and the equilateral torus in S^5 are the only Willmore stable minimal tori in arbitrary higher co-dimension. Moreover, the Clifford torus is the only minimal torus strictly Willmore stable in arbitrary higher co-dimension. And the equilateral torus is a (local) constrained-Willmore minimizer, but not a (local) Willmore minimizer.

- (5) 王 越 (首都师范大学)

Title: On global regularity and boundary Layer separation of steady Prandtl equations

Abstract: For the 2-D steady Prandtl Equations, Oleinik proved the global-in-x existence of solutions with finite order regularity in the case of favorable pressure gradient and the local-in-x existence of solutions in the case of adverse pressure gradient. In this talk, I will first review some related results and then report our recent works for the 2-D steady Prandtl Equations where

1. we proved the global C^∞ regularity in the case of favorable pressure gradient; 2. we proved the boundary layer separation for a large class of Oleinik's solutions and study the local behavior of the solutions near the separation in the case of adverse pressure gradient.

(6) 韦 韡 (复旦大学)

Title: σ_2 Yamabe problem and related σ_2 Penrose inequality on 4-manifolds

Abstract: We raise the σ_2 Yamabe problem for conic 4-manifolds. For conic 4-spheres, we find a necessary condition for the existence of solutions, and discuss the borderline case. If the σ_2 curvature has lower bound $\frac{3}{2}$, we prove a Penrose type inequality relating the mass and contributions from singularities.

(7) 吴 楠 (南京大学)

Title: Improved Sobolev trace inequality under constraints

Abstract: In this talk, inspired by Chang-Hang's work on the improved Moser-Trudinger inequality under constraints, we will talk about our results on the improved Sobolev trace inequality under high moments vanishing condition. We will also talk about its generalizations of conformally covariant operator of fourth order. This is the joint work with Xuezhong Chen.

(8) 许小卫 (中国科技大学)

Title: New area-minimizing Lawson-Osserman cones

Abstract: In this talk, I will introduce three types of Lawson-Osserman cones. They are composition of a Hopf fibration and standard isometric minimal immersions of degree two. By using Lawlor's criterion, we show that they are area-minimizing. In particular, two undetermined minimal cones given in [LO77] will be shown area-minimizing. This is a joint work with L. Yang and Y. Sh. Zhang.

(9) 张科伟 (北京师范大学)

Title: A Moser-Trudinger type inequality and its applications in Kahler geometry

Abstract: I will report some recent progress on certain Moser-Trudinger type inequality on Kahler manifolds. Some applications, including a Kahlerian Bishop type theorem and a new computable criterion for the existence of cscK metrics, will be presented.

(10) 张世红 (南京大学)

Title: A Liouville type theorem of the linearly perturbed Paneitz equation on S^3

Abstract: We prove a Liouville type theorem for the linearly perturbed Paneitz equation: For $\epsilon > 0$ small enough, if u_ϵ is a positive smooth solution of

$$P_{S^3}u_\epsilon + \epsilon u_\epsilon = -u_\epsilon^{-7} \quad \text{on } S^3,$$

where P_{S^3} is the Paneitz operator of the round metric g_{S^3} , then u_ϵ is constant. This confirms a conjecture proposed by Fengbo Hang and Paul Yang in [Int. Math. Res. Not. IMRN, 2020 (11)].

(11) 张世金 (北京航空航天大学)

Title: A survey on gradient shrinking Ricci solitons

Abstract: Gradient shrinking Ricci soliton is as generalization of Einstein metric, is also as a self-similar solution of Ricci flow and as a critical point of Perelman's entropy. This is a survey talk about some properties of the gradient shrinking Ricci solitons and some related problems. Part of the talk is a joint work with Guoqiang Wu.

(12) 郑 恺 (同济大学)

Title: Singular cscK metrics and K-stability

Abstract: In this talk, we will present recent progress on the Yau-Tian-Donaldson conjecture, with emphasis on the K-stability notions in the singular setting.