2018 代数与几何拓扑会议

一、会议地点：西南交通大学峨眉校区第五会议室

二、会议日程安排：

1. 2018 年 7 月 28 日在湖山宾馆报到；
2. 2018 年 7 月 29-30 日学术报告；
3. 2018 年 7 月 31 日离开。

7 月 29 日	峨眉校区第五会议室	
8:30-9:00	开幕式及合影	
主持	李维萍（西南交通大学）	
9:00-9:50	段海豹（中国科学院）	The characteristic classes and Weyl invariants of the Spin geometry
9:50-10:00	茶歇	
10:00-10:50	王向军（南开大学）	On the homotopy elements h_0h_n in the classical ASS
10:50-11:00	茶歇	
11:00-11:50	刘秀贵（南开大学）	Rational homotopy of the homotopy fixed point sets of S^3 actions
12:00-14:00	午餐（湖山宾馆）	
主持	吕志（复旦大学）	
14:00-14:50	杨文元（北京大学）	Genericity of contracting elements in groups
14:50-15:00	茶歇	
15:00-15:50	于立（南京大学）	On the existence of positive scalar curvature on small covers and real moment-angle manifolds
15:50-16:00	茶歇	
16:00-16:50	许明（首都师范大学）	Geodesic and curvature of a piecewise flat Finsler surface
16:50-17:00	茶歇	
17:00-17:50	张永胜（东北师范大学）	On Realization of tangent cones of homologically area-minimizing compact singular submanifolds
18:00-20:00	晚宴（湖山宾馆）	

7 月 30 日	西南交通大学峨眉校区第五会议室	
主持	段海豹（中国科学院）	
8:00-8:50	吕志（复旦大学）	On Kosniowski conjecture
8:50-9:00	茶歇	
9:00-9:50	李平（同济大学）	Kaehler hyperbolic manifolds and Chern number inequalities
9:50-10:00	茶歇	
10:00-10:50	陈庆陶(瑞士苏黎世理工学院）	Recent progress of various Volume Conjectures for links as well as 3-manifolds
10:50-11:00	茶歇	
11:00-11:50	陈立志（兰州大学）	Systolic volume and complexity of 3-manifolds
12:00-14:00	午餐（湖山宾馆）	
14:00-18:00	自由讨论(free discussion)	
18:00-20:00	晚宴（湖山宾馆）	

三、报告题目与摘要：

1. 段海豹，中国科学院

Title: The characteristic classes and Weyl invariants of the Spin geometry

Abstract: Based on a pair of new cohomology operations on 2-formal spaces we determine the integral cohomology rings of the classifying spaces $%B_{Spin(n)}$ and $B_{Spinˆ{c}(n)}$.As applications, we introduce the characteristic classes for the topological K_{Spin} and $K_{Spinˆ{c}}$ theories, and present an effective algorithm to produce of the integral Weyl invariants of the Lie groups $Spin(n)$ and $%Spinˆ{c}(n)$.

2. 王向军，南开大学

Title: On the homotopy elements h_0h_n in the classical ASS

Abstract: In this talk, I will introduce the elements h_0h_n in the E_2-term of the classical Adams spectral sequence and of the Adams-Novikov spectral sequence. I will also introduce the {\it method of infinite descent}, by which we proved that h_0h_3 is a permanent cycle. At last I will introduce our further consideration on the convergence of elements h_0h_n.

3. 刘秀贵，南开大学

Title: Rational homotopy of the homotopy fixed point sets of S^3 actions

Abstract: An action of a group G on a space gives rise to two natural spaces, the fixed point set and the homotopy fixed point set. In this talk, when G is S^3 and M is a G-space, we study the rational homotopy type of the homotopy fixed point set M^{hG}, and the natural injection $M^G\rightarrow M^{hG}$. This is a joint work with Yanlong Hao and Qianwen Sun.

4. 吕志，复旦大学

Title: On Kosniowski conjecture

Abstract: Let M be a unitary closed manifold that admits an action of a circle preserving the unitary structure and fixing some isolated points. Kosniowski conjectured in 1980 that if M is not a boundary, then the number of isolated points is at least [dim M/4]+1. This talk will discuss different statements of Kosniowski conjecture and state some recent progresses.

5. 杨文元，北京大学国际数学中心

Title: Genericity of contracting elements in groups

Abstract: In this talk, I will introduce a class of statistically convex-cocompact actions for groups with a contracting element. This could be thought of as a statistical version of convex-cocompact Kleinian groups. This notion includes relatively hyperbolic groups, CAT(0) groups with rank-1 elements, mapping class groups on Teichmuller spaces, etc. Our main result shows that this class of groups have purely exponential growth, and contracting elements are exponentially generic. This gives many new classes of groups with these properties, and generalizes some known results. Strengthening a theorem of Maher, one corollary is that pseudo-Anosov elements are exponentially generic in mapping class groups. Another is a generalization of a result of Knieper to singular setting that non-rank-1 geodesics are exponentially small in CAT(0) groups。

6. 于立，南京大学

Title: On the existence of positive scalar curvature on small covers and real moment-angle manifolds

Abstract: We study small covers and the real moment-angle manifold over a simple polytope that admit Riemannian metrics of positive scalar curvature. We first explain some general facts on the existence of positive scalar curvature on a smooth manifold. Then we show a class of simple polytopes over which the small covers and the real moment-angle manifolds admit metrics of positive scalar curvature. In particular, these examples give all the 3-dimensional small covers that admit

metrics of positive scalar curvature. In addition, our study leads to an interesting problem in combinatorics.

7. 李平，同济大学

Title：Kaehler hyperbolic manifolds and Chern number inequalities

Abstract：In this talk we will review two well-known conjectures due to Hopf and S.-T. Yau respectively, and explain their connections via the concept of “Kaehler hyperbolicity” introduced by Gromov. Then we shall report our recent work around Kaehler hyperbolic manifolds.

8. 张永胜，东北师范大学

Title：On Realization of tangent cones of homologically area-minimizing compact singular submanifolds

Abstract: We apply the theory of calibrations to the study of realization of tangent cones of homologically area-minimizing compact singular submanifolds and show that every oriented area-minimizing cone verifiable through Lawlor’s curvature criterion can be realized.

9. 陈庆陶，苏黎世联邦理工学院

Title：Recent progress of various Volume Conjectures for links as well as 3-manifolds

Abstract： The original Volume Conjecture predicts a precise relation between the asymptotics of the colored Jones polynomials (Kashaev invariants) of a knot in S^3 and the hyperbolic volume of its complement. I will discuss two different directions that lead to generalizations of this conjecture.

The first direction concerns different quantum invariants of knots, arising from the colored SU(n) (with the colored Jones polynomial corresponding to the case n= 2). I will first display subtle relations between congruence relations, cyclotomic expansions and the original Volume Conjecture for colored Jones polynomials of knots. I will then generalize this point of view to the colored SU(n) invariant of knots. Certain congruence relations for colored SU(n) invariants, discovered in joint work with K. Liu, P. Peng and S. Zhu, lead us to formulate cyclotomic expansions and a Volume Conjecture for these colored SU(n) invariants. I will also discuss similar ideas for the superpolynomials that arise in HOMFLY-PT homology as well as other different situations.

Another direction for generalization involves the Witten-Reshetikhin-Turaev and (modified) Turaev-Viro quantum invariants of 3-manifolds. In a joint work with T. Yang, we formulated a new Volume Conjecture for the asymptotics of these 3-manifolds invariants evaluated at certain roots of unit, and numerically checked it for many examples. Interestingly, this conjecture uses roots of unity that are different from

the one usually considered in literature. This may indicate that the understanding of this new phenomenon requires new physical and geometric interpretations that go beyond the usual quantum Chern-Simons theory. I will also introduce recent progress in this direction.

10. 徐明，首都师范大学

Title：Geodesic and curvature of a piecewise flat Finsler surface

Abstract：This talk is based on my joint work with S. Deng. The idea was inspired from lunch-chatting and dinner-chatting with Huibin Chang, Ju Tan and Lei Zhang respectively. I would also like to sincerely thank Fuquan Fang and the referee of this paper for precise advices. The purpose of this talk is to show how the combinatoric methods can be introduced to the study of Finsler geometry. Firstly, I will introduce the concept of piecewise flat Finsler surface. Secondly, I will show the local behavior of the geodesics. Thirdly, I will define a (Riemannian type) curvature from the process of extending geodesics. Lastly, I will define the notions of Berwald space and Landsberg space in the piecewise flat context, and show a combinatoric Gauss-Bonnet formula.

11. 陈立志，兰州大学

Title： Systolic volume and complexity of 3-manifolds

Abstract：The systolic volume is a topological invariant of manifolds, defined as the optimal constant in a systolic inequality. It shows there are various relations between systolic volume and other topological invariants. We investigate the relation between systolic volume and complexity of 3-manifolds. The complexity of a closed 3-manifold is defined to be the minimum number of tetrahedron in a triangulation. We prove the systolic volume of aspherical 3-manifolds can be upper bounds in terms of complexity.