

The 7th Japan-China Geometry Conference

Hiroshima, Japan
December 23-29, 2022



OCAMI

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December 24, Saturday

Chair	Time	Speaker	Title
Hiroshi Tamaru	Beijing Time 08:45--09:00 Tokyo Time 09:45--10:00	Takashi Shioya (Tohoku University)	Welcome speech
	Beijing Time 09:00--09:15 Tokyo Time 10:00--10:15	Weiping Zhang (Nankai University) Ryushi Goto (Osaka University)	Opening speech
Shouhei Honda	Beijing Time 09:20--10:10 Tokyo Time 10:20--11:10	Gang Tian (Peking University)	Ricci flow on Fano manifolds
	Beijing Time 10:15--11:05 Tokyo Time 11:15--12:05	Akito Futaki (Tsinghua University)	Transverse coupled Kähler-Einstein metrics, moment polytopes and volume minimization
	Beijing Time 11:10--11:30 Tokyo Time 12:10--12:30	Photo	
	Beijing Time 11:30--14:00 Tokyo Time 12:30--15:00	Lunch	
Qing Ding	Beijing Time 14:00--14:50 Tokyo Time 15:00--15:50	Yu Zheng (East China Normal University)	Some new inequalities along the Ricci flow
	Beijing Time 14:55--15:10 Tokyo Time 15:55--16:10	Tea Break	
Weiping Zhang	Beijing Time 15:10--16:00 Tokyo Time 16:10--17:00	Yu Fu (Dongbei University of Finance and Economics)	Recent progress on biharmonic conjectures
	Beijing Time 16:05--16:55 Tokyo Time 17:05--17:55	Xiaonan Ma (Université de Paris and Sorbonne Université)	Superconnection and family Bergman kernels

December 25, Sunday

Chair	Time	Speaker	Title
Zizhou Tang	Beijing Time 09:00--09:50 Tokyo Time 10:00--10:50	Hokuto Konno (University of Tokyo)	Homological instability for moduli spaces of 4-manifolds
	Beijing Time 09:55--10:30 Tokyo Time 10:55--11:30	Tea Break	
	Beijing Time 10:30--11:20 Tokyo Time 11:30--12:20	Yuchen Bi (University of Chinese Academy of Science)	The critical Allard regularity theorem in 2-dimension
	Beijing Time 11:30--14:00 Tokyo Time 12:30--15:00	Lunch	
Ayato Mitsuishi	Beijing Time 14:00--14:50 Tokyo Time 15:00--15:50	Yu Kitabeppu (Kumamoto University)	Coarse Ricci curvature on hypergraphs
	Beijing Time 14:55--15:20 Tokyo Time 15:55--16:20	Tea Break	
Haizhong Li	Beijing Time 15:20--16:10 Tokyo Time 16:20--17:10	Li Sheng (Sichuan University)	Extremal metrics on toric manifolds and homogeneous toric bundles
	Beijing Time 16:15--17:05 Tokyo Time 17:15--18:05	Peng Wang (Fujian Normal University)	On the Willmore problem for surfaces with symmetries

December 26, Monday

Chair	Time	Speaker	Title
Ryushi Goto	Beijing Time 08:30--09:20 Tokyo Time 09:30--10:20	Jixiang Fu (Fudan University)	A deformed Hermitian Yang-Mills flow
	Beijing Time 09:25--09:40 Tokyo Time 10:25--10:40	Tea Break	
Changping Wang	Beijing Time 09:40--10:30 Tokyo Time 10:40--11:30	Xianfeng Wang (Nankai University)	Self-similar solutions to fully nonlinear curvature flows by high powers of curvature
	Beijing Time 10:35--11:25 Tokyo Time 11:35--12:25	Yuji Sano (Fukuoka University)	On vertices of the Hurwitz polytopes of toric varieties
	Beijing Time 11:30--14:00 Tokyo Time 12:30--15:00	Lunch	
Hitoshi Moriyoshi	Beijing Time 14:00--14:50 Tokyo Time 15:00--15:50	Liding Huang (Westlake University)	Fully non-linear elliptic equations on compact almost Hermitian manifolds
	Beijing Time 14:55--15:20 Tokyo Time 15:55--16:20	Tea Break	
Takashi Shiota	Beijing Time 15:20--16:10 Tokyo Time 16:20--17:10	Mayuko Yamashita (Kyoto University)	Topological Modular Forms and absence of heterotic anomalies
	Beijing Time 16:15--17:05 Tokyo Time 17:15--18:05	Chao Xia (Xiamen University)	Heintze-Karcher's inequality and Alexandrov's theorem for capillary hypersurfaces

December 27, Tuesday

Chair	Time	Speaker	Title
	Beijing Time 09:00--11:20 Tokyo Time 10:00--12:20		Free Discussion
	Beijing Time 11:30--14:00 Tokyo Time 12:30--15:00		Lunch
	Beijing Time 14:00--17:00 Tokyo Time 15:00--18:00		Free Discussion

December 28, Wednesday

Chair	Time	Speaker	Title
Jiayu Li	Beijing Time 09:00--09:50 Tokyo Time 10:00--10:50	Xi Zhang (Nanjing University of Science and Technology)	The HN-positivity of holomorphic vector bundles
	Beijing Time 09:55--10:30 Tokyo Time 10:55--11:30	Tea Break	
	Beijing Time 10:30--11:20 Tokyo Time 11:30--12:20	Ming Li (Chongqing University of Technology)	On the unicorn problem and related results in Finsler geometry
	Beijing Time 11:30--14:00 Tokyo Time 12:30--15:00	Lunch	
Huitao Feng	Beijing Time 14:00--14:50 Tokyo Time 15:00--15:50	Ryosuke Takahashi (Kyushu University)	A Nakai--Moishezon type criterion for supercritical deformed Hermitian--Yang--Mills equation
	Beijing Time 14:55--15:20 Tokyo Time 15:55--16:20	Tea Break	
Reiko Miyaoka	Beijing Time 15:20--16:10 Tokyo Time 16:20--17:10	Wenjiao Yan (Beijing Normal University)	On two questions of James
	Beijing Time 16:15--17:05 Tokyo Time 17:15--18:05	Shoichi Fujimori (Hiroshima University)	Higher genus nonorientable maximal surfaces in the Lorentz- Minkowski 3-space
	Beijing Time 17:10--17:20 Tokyo Time 18:10--18:20	Hitoshi Moriyoshi (Nagoya University)	Closing Speech

The 7th China-Japan Geometry Conference

Date: December 24 – 28, 2022.

Venue: Hiroshima University.

Gang Tian (Peking University)

Title: Ricci flow on Fano manifolds

Abstract: TBA

Akito Futaki (Tsinghua University)

Title: Transverse coupled Kähler-Einstein metrics, moment polytopes and volume minimization

Abstract: On toric Sasaki manifolds, Sasaki-Einstein metrics are obtained by volume minimization. In this talk, I will re-visit its proof and try to extend it to Transverse coupled Kähler-Einstein metrics.

Yu Zheng (East China Normal University)

Title: Some new inequalities along the Ricci flow

Abstract: In this talk, some new inequalities will be introduced along the Ricci flow under one new convexity assumption on Riemannian curvature operator. This new convexity can be viewed as an interpolation between the positivity and 2-positivity of the Riemannian curvature operator. This work is jointed with Xiaodong Cao.

Yu Fu (Dongbei University of Finance and Economics)

Title: Recent progress on biharmonic conjectures

Abstract: In the past two decades, biharmonic maps and biharmonic submanifolds have attracted much attention from mathematicians. In particular, concerning biharmonic conjectures, many important progress has been made so far. In this talk, I would like to report some recent progress on biharmonic conjectures and several related results on hypersurfaces.

Xiaonan Ma (Université de Paris and Sorbonne Université)

Title: Superconnection and family Bergman kernels

Abstract: We establish an asymptotic version of Bismut's local family index theorem for the Bergman kernel associated with a fiberwise positive line bundle when the power tends to infinity. The key idea is to use the superconnection as in the local family index theorem. In particular, we show the curvature operator of the associated direct image is a Toeplitz operator.

Hokuto Konno (The University of Tokyo)

Title: Homological instability for moduli spaces of 4-manifolds

Abstract: We prove that homological stability with respect to connected sums of $S^2 \times S^2$ fails for moduli spaces $\text{BDiff}(X)$ of simply-connected closed 4-manifolds X . This makes a striking contrast with

other dimensions: in all even dimensions except for 4, analogous stability has been established by work of Harer and of Galatius and Randal-Williams. The proof of the above result is based on a characteristic class constructed using the Seiberg-Witten equations. This is joint work with Jianfeng Lin.

Yuchen Bi (Academy of Mathematics and Systems Science)

Title: The critical Allard regularity theorem in 2-dimension

Abstract: In this talk, we will give a description of the local geometry of 2-dimensional varifolds with critical allard conditions. In particular, these varifolds admit bilipschitz parameterizations. As an application, we show these varifolds have square integrable second fundamental forms. This talk is based on a work joint with Dr. Jie Zhou.

Yu Kitabeppu (Kumamoto University)

Title: Coarse Ricci curvature on hypergraphs

Abstract: There are various version of concepts of Ricci curvature on graphs and hypergraphs. In this talk, we define Lin-Lu-Yau type coarse Ricci curvature on hypergraphs by using the resolvent of the non-linear Laplacian. Also we discuss about some geometric consequences on hypergraphs with Ricci curvature bounded from below.

Li Sheng (Sichuan University)

Title: Extremal metrics on toric manifolds and homogeneous toric bundles

Abstract: An example of Apostolov et al. indicate that the condition of K-stability may not be correct one for general polarised manifolds. Székelyhidi modified definition of K-stability by filtration and stated a variant of the Yau-Tian-Donaldson conjecture. We will talk about our proof of this variant of YTD conjecture for toric manifolds and homogeneous toric bundles. This is jointed with Li An-Min and Lian Zhao.

Peng Wang (Fujian Normal University)

Title: On the Willmore problem for surfaces with symmetries

Abstract: The famous Willmore conjecture states that the Clifford torus minimizes Willmore energy among all 2-tori in S^3 , which was proved by Marques and Neves. For higher genus surfaces, it was conjectured by Kusner that the Lawson minimal surfaces $\xi_{g,1}$ minimizes the Willmore energy for all immersions in S^3 with genus $g > 1$. We show that it holds for surfaces in S^3 which have genus $g > 1$ and are symmetric w.r.t. the group $\tilde{G}_{g,1}$. Here $\tilde{G}_{g,1}$ denotes a group generated by halfturns about some great circles of S^3 , which is a subgroup of the symmetric group of $\xi_{g,1}$. This is a joint work with Prof. Kusner (UMass Amherst) and Prof. Ying Lv (Xiamen Univ.)

Jixiang Fu (Fudan University)

Title: A deformed Hermitian Yang-Mills flow

Abstract: We introduce a deformed Hermitian Yang-Mills flow, and present some results on this flow, including the longtime existence, the convergence under the subsolution condition, and as an application, the convergence on a Kahler surface case under the semisubsolution condition. This is a joint work with Shing-Tung Yau and Dekai Zhang.

Xianfeng Wang (Nankai University)

Title: Self-similar solutions to fully nonlinear curvature flows by high powers of curvature

Abstract: In this talk, we will discuss self-similar solutions to contracting curvature flows, which play an important role in the study of the asymptotic behaviors of mean curvature flow and flow by powers of the Gauss curvature. We will present some recent results on the uniqueness of self-similar solutions to a large family of fully nonlinear curvature flows by high powers of curvature. This is joint work with Dr. Shanze Gao and Prof. Haizhong Li.

Yuji Sano (Fukuoka University)

Title: On vertices of the Hurwitz polytopes of toric varieties

Abstract: S. Paul introduces K-stability of the pair of the Chow form and the hyperdiscriminant. The hyperdiscriminant coincides the Hurwitz form studied by B. Sturmfels. Motivated by their works, we discuss the computation of the weight polytope of the Hurwitz form of a polarized toric variety following the theory of Gelfand-Kapranov-Zelevinsky. This talk is based on a joint work with Ryoma Ogusu.

Liding Huang (Westlake University)

Title: Fully non-linear elliptic equations on compact almost Hermitian manifolds

Abstract: We will talk about a priori estimates for solutions of a general class of fully non-linear equations on compact almost Hermitian manifolds. As an application, we will solve the complex Hessian equation and the Monge–Ampère equation for $(n-1)$ -plurisubharmonic equations in the almost Hermitian setting. We will also show the second order estimates for the fully nonlinear elliptic equations with gradient terms, including the deformed Hermitian-Yang-Mills equation and the equation in the proof of Gauduchon conjecture by Szekelyhidi-Tosatti-Weinkove.

Yamashita Mayuko (Kyoto University)

Title: Topological Modular Forms and absence of heterotic anomalies

Abstract: In this talk, I will explain my work with Yuji Tachikawa, to use algebraic topology to a physical problem of vanishing of anomalies in heterotic string theories. We translate the problem into a mathematical problem to show that a certain transformation of generalized cohomology theories from TMF (Topological Modular Forms) to the Anderson dual to String bordism. TMF is related to 2d superconformal field theories via Stolz-Teichner conjecture, and the Anderson duals are related to classification of anomalies via Freed-Hopkins conjecture. I will start from general idea to use algebraic topology to analyze anomalies in quantum field theories, and explain our works including further recent progress.

Chao Xia (Xiamen University)

Title: Heintze-Karcher's inequality and Alexandrov's theorem for capillary hypersurfaces

Abstract: Heintze-Karcher's inequality is an interesting geometric inequality which can be used to prove Alexandrov's theorem on embedded closed CMC hypersurfaces. In this talk, we prove a Heintze-Karcher-type inequality for hypersurfaces with boundary in the half-space and a wedge. As application, we show Alexandrov-type theorem for embedded CMC capillary hypersurfaces. If time permits, we talk on the generalization to the anisotropic capillary setting. This is joint work with Xiaohan Jia, Guofang Wang and Xuwen Zhang.

Xi Zhang (Nanjing University of Science and Technology)

Title: The HN-positivity of holomorphic vector bundles

Abstract: The HN-positivity of holomorphic vector bundle is defined by the slope of quotient sheaves. In this talk, by using the perturbed Hermitian-Yang-Mills equation, we show that the HN-positivity is equivalent to the existence of Hermitian metric with positive mean curvature. As applications, we obtain some vanishing theorems, prove that there must exist a Hermitian metric with positive mean curvature on ample bundle and establish the equivalence between rational connectedness in algebraic geometry and mean curvature positivity in differential geometry. This work is joint with Chao Li and Chuanjing Zhang.

Ming Li (Chongqing University of Technology)

Title: On the unicorn problem and related results in Finsler geometry

Abstract: An unicorn in Finsler geometry means a Landsberg metric which is not Berwaldian. The unicorn problem is to find unicorns. In this talk, we will first give a brief introduction to the geometric structures and invariants of Finsler manifolds. Next, a very short survey of the unicorn problem will be presented. Then we introduce an approach

to deal with the unicorn problem, by using the rigidity results in the centro-affine differential geometry. As applications, we prove that there is no unicorn in two classes of Finsler metrics. We will also discuss some other non-Riemannian quantities related to the unicorn problem. This talk is partially based on the joint work with Professor Huitao Feng.

Ryosuke Takahashi (Kyushu University)

Title: A Nakai–Moishezon type criterion for supercritical deformed Hermitian–Yang–Mills equation.

Abstract: In this talk, we show that the solvability of the supercritical deformed Hermitian–Yang–Mills equation is equivalent to a certain algebraic positivity condition modeled on the Nakai–Moishezon ampleness criterion, which confirms the mirror version of the Thomas–Yau conjecture. This is a joint work with J. Chu (Peking University) and M.-C. Lee (Chinese University of Hong Kong).

Wenjiao Yan (Beijing Normal University)

Title: On two questions of James

Abstract: There are a number of fascinating and important properties of the Stiefel manifolds $V_k(F^n)$ ($F = R, C, H$) which are defined to be the set of all orthonormal k -frames in F^n with respect to real, complex or quaternionic inner products. For example, they are compact smooth manifolds, and diffeomorphic to homogeneous spaces. Moreover, there are natural fibre bundles $\pi : V_k(F^n) \rightarrow V_q(F^n)$ ($q < k$) by taking the last q vectors of each k -frame as a q -frame. In 1958, I. M. James defined the octonionic Stiefel spaces $V_k(O^n)$ — the space of orthonormal k -frames in O^n with natural topology, and raised two fundamental questions about $V_k(O^n)$: (1) Is the projection $\pi : V_k(O^n) \rightarrow V_q(O^n)$ ($q < k$) a fiber map? (2) Is $V_k(O^n)$ a manifold? We give partial answers to both of them. This talk is based on joint work with Professor Zizhou Tang and Professor Chao Qian.

Shoichi Fujimori (Hiroshima University)

Title: Higher genus nonorientable maximal surfaces in the Lorentz-Minkowski 3-space.

Abstract: The topic of this talk is about nonorientable maximal surfaces in Lorentz-Minkowski 3-space. We give some existence results for surfaces of this kind with high genus and one end. This is joint work with Shin Kaneda.