Sino-Russian Joint Forum

Frontier of Differential Geometry

27-30 September 2021

Schedule

Date/Time	27 September 2021 (Monday)	28 September 2021 (Tuesday)	29 September 2021 (Wednesday)	30 September 2021 (Thursday)
Opening Ceremony	Zhang Jiping Cao Peng	-	-	-
Lecture 1	G. I. Sharygin	A. A. Tuzhilin	D. A. Timashev	A. B. Zheglov
Lecture 2	Zhu Xiaohua	Liu Yi	Yang Xiaokui	Deng Yuxing

Time table

Lecture 1: 15:00-15:50 (Beijing)/10:00-10:50 (Moscow)

Lecture 2: 16:00-16:50 (Beijing)/11:00-11:50 (Moscow)

Opening Ceremony: 14:45-15:00 (Beijing)/09:45-10:00 (Moscow), 27 September 2021

Zoom Link

Conference number: 308 279 7517

Password: 035855

Link: *https://zoom.us/j/3082797517?pwd=MW5TWFpJUm1yazQxV1FxN2RudktVZz09*

Titles and Abstracts

1) G. I. Sharygin

Title: Symmetries of the full symmetric Toda system on real Lie algebras

Abstract: The full symmetric Toda system is the dynamical system, associated with a Cartan decomposition of a real form of semisimple Lie algebra. It is known that the system is Hamiltonian and integrable. However the construction of the first integrals of this system is not an easy task, the existing constructions are rather complicated and may seem artificial. In my talk, based on the joint work with Yu. Chernyakov and A. Sorin I will describe a way to construct a large commutative family of symmetries of this system, i.e. of vector fields, that will commute with each other and with the vector field that generates the system. The construction is based on the geometric considerations and on the structure of representations of the Lie algebra.

2) A. A. Tuzhilin

Title: Symmetries of Gromov-Hausdorff Distance

Abstract: The famous Gromov-Hausdorff distance measures the difference between metric spaces. Since it both satisfies the triangle inequality and vanishes for isometric metric spaces, it induces correctly a correspondent distance on isometry classes of metric spaces. The collection of all such classes form a proper class in terms of Von Neumann – Bernays – Gödel set theory. We call such proper class by Gromov-Hausdorff class and denote it as GH. The main question for our talk is to discuss what are the isometric mappings (local and global) of GH. One of the most investigated part of GH is the Gromov-Hausdorff space M consisting of all non-empty compact metric spaces (considered up to isometry).

We start with a sketch of Ivanov-Tuzhilin's proof of the George Lowther (perhaps it is a pseudonym) result stated that the isometry group of M is trivial. Then we discuss some local isometries of M: it turns out that there are a lot of them. At last, we formulate some conjectures concerning the whole Gromov-Hausdorff class GH.

3) D. A. Timashev

Title: Component group and Galois cohomology of real reductive groups

Abstract: For a connected reductive algebraic group G defined over the field of real numbers R, the group of real points G(R) is a real Lie group, not necessarily connected; look at GL_n(R) or SO_{p,q}(R) for example. A natural problem is to determine the component group of G(R). It turns out that this problem is related to

another important problem in the theory of algebraic groups: to compute the Galois cohomology H^1(R,G). We give a uniform solution to both problems in terms of combinatorial data which determine the reductive group G over R, such as the affine Dynkin diagram with a nonnegative integer labeling of its vertices and the cocharacter lattice of a maximal torus equipped with an involution. Though the answer is purely algebraic and combinatorial, the proofs involve transcendental Lie-theoretic and differential-geometric methods such as the exponential mapping on algebraic tori and an action of the affine Weyl group on their Lie algebras.
This is a joint work with Mikhail Borovoi.

4) A. B. Zheglov
Title: The Schur-Sato theory for quasi-elliptic rings and some of its applications
Abstract: The notion of quasielliptic rings appeared as a result of an attempt to classify a wide class of commutative rings of operators found in the theory of integrable systems, such as rings of commuting differential, difference, differential-difference, etc. operators. They are contained in a certain non-commutative "universe" ring - a purely algebraic analogue of the ring of pseudodifferential operators on a manifold, and admit (under certain mild restrictions) a convenient algebraic-geometric description. An important algebraic part of this description is the Schur-Sato theory - a generalisation of the well known theory for ordinary differential operators. I'll talk about this theory in dimension n and about some of its unexpected applications related to the generalized Birkhoff decomposition and to the Abhyankar formula.

5) Zhu Xiaohua
Title: Kähler-Ricci flow on a Fano manifold
Abstract: This is an expository talk. We will discuss some recent development in Kähler-Ricci flow on Fano manifolds. Mainly, we talk about Perelman's fundamental estimates in Kähler-Ricci flow and the progress on Hamilton-Tian conjecture.

6) Liu Yi
Title: On determining 3-manifold groups with their finite quotient groups
Abstract: In this talk, I will report a recent result of mine showing that the profinite completion of the fundamental group determines finite-volume hyperbolic 3-manifolds up to finitely many possibilities. I plan to spend most of the time discussing background of that problem, so the talk should be accessible to audience with general math background.

7) Yang Xiaokui

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

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

8) Deng Yuxing

Title: The asymptotic geometry of 4D steady Ricci solitons

Abstract: The asymptotic geometry is important for the classification of Ricci solitons. In this talk, we will classify the asymptotic geometry of 4D steady gradient Ricci solitons whose Ricci curvature is nonnegative outside a compact set. As an application, we will show such steady Kähler-Ricci solitons must be Ricci-flat.