

Abstract

Saito Kyoji (IPMU)

Title: Vanishing cycles of types $A_{\frac{1}{2}\infty}$ and $D_{\frac{1}{2}\infty}$

Abstract: We introduce two transcendental functions of two variables, which we shall call of types $A_{\frac{1}{2}\infty}$ and $D_{\frac{1}{2}\infty}$, since they define fibrations over complex plane minus two points, respectively, such that the vanishing cycles in there generic fiber spans lattices of types $A_{\frac{1}{2}\infty}$ and $D_{\frac{1}{2}\infty}$.

Hà Huy Vui (Institute of Mathematics, VAST)

Title: Łojasiewicz inequality near the zero fiber

Abstract: We prove some versions of Łojasiewicz inequality near the zero fiber for polynomials in n real variables.

Jean-Paul Brasselet (CNRS)

Title: Characteristic classes of singular varieties and motivic theory

Abstract: This is a joint work with Jörg Schürmann (Münster) and Shoji Yokura (Kagoshima).

The Hirzebruch theory unify the three theories of characteristic classes: Chern, Todd and Thom-Hirzebruch classes, whose degree zero components are respectively Euler-Poincaré characteristic, arithmetic (or Todd) genus and the signature. In the case of a singular algebraic complex variety, there is no more characteristic classes in cohomology, but classes in homology. The three theories are generalised by the (homology) transformations of Schwartz-MacPherson, Baum-Fulton-MacPherson and Cappell-Shaneson respectively. The problem is that these transformations are defined on different spaces. Using the motivic theory, more precisely the Grothendieck relative group of algebraic varieties over the algebraic variety, one can unify the three transformations.

Usui Sampei (Osaka University)

Title: Log mixed Hodge theory and applications (joint with K. Kato and C. Nakayama)

Abstract: With a work, we constructed toroidal partial compactifications of moduli space of mixed Hodge structures with polarized graded quotients. They are moduli spaces of log mixed Hodge structures with polarized graded quotients. They have applications to Torelli theorem for some CY manifolds, Neron models, ...

Nguyễn Văn Châu (Institute of Mathematics, VAST)

Title: Rational polynomials and the plane Jacobian problem

Abstract: The plane Jacobian conjecture asserts that every polynomial map $(P, Q): \mathbf{C}^2 \rightarrow \mathbf{C}^2$ is inverse if the jacobian $J(P, Q)$ is non-zero constant. In this talk we will discuss on the most simple situation of this problem when either or both P and Q are rational polynomials, i.e. polynomials having generic fiber diffeomorphic to the punctured 2D- sphere.

Oda Tadao (Tohoku University)

Title: Convex polyhedral tilings hidden in crystal lattices — an unexpected application of algebraic geometry

Abstract: Out of finite multigraphs, M. Kotani and T. Sunada (Trans. AMS, 2000) constructed crystal lattices in Euclidean spaces, while T. Oda and C. S. Seshadri (Trans. AMS, 1979) constructed convex polyhedral tilings of Euclidean spaces out of finite multigraphs, in connection with compactifications of generalized Jacobian varieties by means of GIT. We recently found out that some of these tilings are hidden in crystal lattices. Could this result be useful in materials science?

Vincent Blanlœil (Strasbourg University, I.R.M.A.)

Title: Topology of Brieskorn singularities

Abstract: In this talk we will give some results about classifications of Brieskorn singularities up to cobordism.

Yoshinaga Masahiko (Kyoto University)

Title: On irreducibility of the moduli space of line arrangements

Abstract: We discuss irreducibility of the moduli space of line arrangements with fixed combinatorial type. We give several sufficient combinatorial conditions for the moduli space to be irreducible, hence connected. (Based on joint work with S. Nazir.)

Nguyễn Tất Thắng (Institute of Mathematics, VAST)

Title: On the topology of rational functions in two complex variables

Abstract: We consider a rational function of two complex variables $F = f/g$ and prove that, with some conditions on the degrees of f and g , then a regular value is a critical value at infinity of the function if and only if the Euler characteristic of the fibres is not constant. We also give the characterization of the critical value at infinity in terms of the Malgrange's condition and the M-tameness.

Ohmoto Toru (Hokkaido University)

Title: Equivariant Chern class for toric singularities

Abstract: I will discuss about T-equivariant Chern-Schwartz-MacPherson class for toric varieties.

Phạm Tiên Sơn (University of Da Lat)

Title: The Łojasiewicz exponent of a subanalytic function at an isolated zero

Abstract: Let $f: (\mathbf{C}^n, 0) \rightarrow (\mathbf{C}, 0)$ be a complex analytic function with isolated singularity at the origin $0 \in \mathbf{C}^n$. It is well known that there exist constants $c, r > 0$ and exponents β, θ such that, for all $\|x\| \leq r$,

$$(1) \quad \|\nabla f(x)\| \geq c\|x\|^\beta, \quad \|\nabla f(x)\| \geq c|f(x)|^\theta.$$

Teissier [6] showed that the smallest possible exponents β, θ for (1) are attained along the polar curve of f and satisfy the following relation:

$$(2) \quad \theta = \frac{\beta}{\beta+1}.$$

On the other hand, it was shown by Gwoździewicz in [1] that the relation (2) does not necessarily hold for real analytic functions.

Now let $f: (\mathbf{R}^n, 0) \rightarrow (\mathbf{R}, 0)$ be a real analytic function defined in a neighborhood of the origin $0 \in \mathbf{R}^n$. Assume that $f(x) > 0$ for $0 < \|x\| \ll 1$. Then $\nabla f(x)$ is nonzero for x close to the origin. According to the classical Łojasiewicz inequality (see [4]), there exist constants $c, r > 0$ and exponents α, β, θ such that, for all $\|x\| \leq r$,

$$(3) \quad |f(x)| \geq c\|x\|^\alpha, \quad \|\nabla f(x)\| \geq c\|x\|^\beta, \quad \|\nabla f(x)\| \geq c|f(x)|^\theta.$$

Gwoździewicz [1] showed that the best exponents α, β, θ for (3) are attained along the polar curve of f , and moreover, these exponents satisfy the following:

$$(4) \quad \alpha = \beta + 1 \quad \text{and} \quad \theta = \frac{\beta}{\beta+1}.$$

The aim of this talk is to establish a *nonsmooth* version of the relation (4) for continuous subanalytic functions.

Given a continuous subanalytic mapping $f: (\mathbf{R}^n, 0) \rightarrow (\mathbf{R}, 0)$, our approach to generalizing the above-mentioned properties relies on a one-sided notion of generalized gradients called subgradients (see, e.g., [5]). Moreover, our technical tool, contrary to [6] and [1] who use polar curves, is based on the notion of tangency varieties (introduced and studied in [2]).

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Andrei Pajitnov (University of Nantes)

Title: Circle-valued Morse theory for complex hyperplane arrangements

Abstract: This is a joint work with Toshitake Kohno.

Let A be an essential complex hyperplane arrangement in an n -dimensional complex vector space V . Let H denote the union of the hyperplanes, and M denote the complement to H in V . We develop the real-valued and circle-valued Morse theory for M and prove, in particular, that M has the homotopy type of a space obtained from a finite n -dimensional CW complex fibered over a circle, by attaching cells of dimension n . We compute the Novikov homology of M .

Namba Makoto (Otemon Gakuin University)

Title: Moduli of quaternion tori

Abstract: In analogy of the moduli of complex tori, we discuss the moduli of quaternion tori. We determine its fundamental domain.

Ishikawa Masaharu (Tohoku University)

Title: Milnor fibrations and contact structures on S^3

Abstract: The topology of Milnor's fibrations of complex plane curve singularities is well-understood and their compatible contact structures as well. As wider subjects, we are studying relationships between fibrations and contact structures for global plane curves and mixed singularities. In this talk, we present two results about compatible contact structures of fibered links in S^3 ; one is related to complex plane curves and the other is to real singularities of form $f\bar{g}$.

Saeki Osamu (Kyushu University)

Title: Connected components of regular fibers of differentiable maps

Abstract: For a map between smooth manifolds, the space of the connected components of its fibers is called the Stein factorization. We first show that for generic smooth maps, the Stein factorizations are triangulable. As an application, we show that every connected component of a regular fiber is null-cobordant if the top dimensional homology of the Stein factorization vanishes. (This is a joint work with J.T. Hiratuka.)

Dinh Sĩ Tiệp (Institute of Mathematics, VAST)

Title: Polynomial horizontal gradient for the standard Engel structure

Abstract: In the case of the standard Engel structure and generic polynomials of bounded degree, we study the set of horizontal critical points and the behaviour of the horizontal gradient trajectories near this set.

Takao Kazuto (Osaka University)

Title: Normalization of the Rubinstein-Scharlemann graphic of Morse functions

Abstract: The Rubinstein-Scharlemann graphic is a powerful machinery for studying Heegaard splitting of 3-manifolds and it is no other than the image of the singular set of a stable map. In this talk, we eliminate its cusps by deformations compatible with the Heegaard splittings.

Nishimura Takashi (Yokohama National University)

Title: Module of vector fields liftable over a finitely determined multigerms

Abstract: A formula for the minimal number of generators for the module of vector fields liftable over a given finitely determined multigerms of corank at most one $f: (\mathbf{K}^n, S) \rightarrow (\mathbf{K}^p, 0)$ ($n \leq p$) is given when there exists a non-negative integer i such that ${}_i\bar{\omega}f$, which is a generalized version of Mather's homomorphism $\bar{\omega}f$, is bijective.

Since the proof provides how to construct generators of liftables in principle, we shall demonstrate to compute concrete generators for some examples.

Nguyễn Khắc Việt (Hanoi University of Education)

Title: Speculations on Pencils of Curves

Abstract: We expose some results on bounding singular fibres, the spectrum, in particular very singular fibres in a pencil of curves and related questions.