

Vietnam Academy of Science and Technology
Japanese Society for the Promotion of Science

Topology of singularities and related topics

Hanoi, March 22-26, 2010

Program & Abstract

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Topology of singularities and related topics

Hanoi, March 22 - 26, 2010

This conference is for the cooperation research between Japan and Vietnam in the region of the real and complex singularities. This cooperation has started for the first time in 1993.

The present one is the first in a (tentative) serie of three conferences under the frame of an agreement of the bilateral cooperation program, supported by JSPS and VAST for the peoriod September 2009 - August 2012.

The organizing commitee are:

- Nguyen Viet Dung, Institute of Mathematics, Hanoi
- Mutsuo Oka, Tokyo University of Science
- Vu The Khoi, Institute of Mathematics, Hanoi
- Masaharu Ishikawa, Tohoku University

The conference is supported by

- Vietnam Academy of Science and Technology
- Japan Society for the Promotion of Science
- Institute of Mathematics, Hanoi

Conference Schedule

Monday, March 22, 2010

Morning

9:00-9:50: **Registration**

9:50-10:00: **Opening Ceremony**

Chair: Ashikaga Tadashi

10:00-10:50: Nguyễn Văn Châu, *Pencil of polynomials and the plane Jacobian conjecture*

10:50-11:20: Coffee break

11:20-12:10: Ishikawa Goo, *Generic bifurcations of framed curves and singularities of their envelopes*

Afternoon

Chair: Nguyễn Văn Châu

14:10-15:00: Hà Huy Vui, *Lojasiewicz inequality at infinity for polynomials in two real variables*

15:00-15:30: Coffee Break

15:30-16:20: Kawashima Masayuki, *On (2,3) torus decompositions of QL-configurations*

Tuesday, March 23, 2010

Morning

Chair: Hà Huy Vui

9:00-9:50: Tokunaga Hiroo, *On quadratic residue curves*

9:50-10:20: Coffee Break

10:20-11:10: Đinh Sỹ Tiệp, *Horizontal gradient of polynomial functions*

11:20-12:10: Namba Makoto, *Pfaffian systems with given monodromy*

Afternoon

Chair: Tokunaga Hiroo

14:10-15:00: Yoshinaga Masahiko, *Minimal presentations for the fundamental groups of the complement of hyperplane arrangements*

15:00-15:30: Coffee Break

15:30-16:20: Nguyễn Tiến Đại, *On the stability of holonome system*

Wednesday, March 24, 2010**Morning**

- Chair: Ishikawa Masaharu
 9:00-9:50: Ishibe Tadashi, *Monoids in the fundamental groups of the complement of logarithmic free divisors in \mathbb{C}^3*
 9:50-10:20: Coffee Break
 10:20-11:10: Nguyễn Việt Dũng, *The homotopy type of the complement to a system of complex lines in \mathbb{C}^2*

Afternoon

- 13:30: **City Tour** (the program will be announced later)

Thursday, March 25, 2010**Morning**

- Chair: Phạm Tiến Sơn
 9:00-9:50: Tạ Lê Lợi, *The dimension of tangent cones and bi-Lipschitz homeomorphisms*
 9:50-10:20: Coffee Break
 10:20-11:10: Nguyễn Khắc Việt, *On μ and related topic*
 11:20-11:35: Trần Gia Lộc, *Bernstein-Sato polynomial and applications*

Afternoon

- Chair: Namba Makoto
 14:10-15:00: Kuno Yusuke, *A new example of Meyer's secondary invariant and its application to degeneration of curves*
 15:00-15:30: Coffee Break
 15:30-16:20: Nguyễn Tất Thắng, *On the topology of polynomial mappings from \mathbb{C}^n to \mathbb{C}^{n-1}*

Evening

- 18:30: **Banquet**

Friday, March 26, 2010**Morning**

- Chair: Tạ Lê Lợi
 9:00-9:50: Kobayashi Masanori, *Isomorphism among families of weighted K3 hypersurfaces*
 9:50-10:20: Coffee Break
 10:20-11:10: Ishikawa Masaharu, *Finite surgeries on three-tangle pretzel knots*
 11:10: **Closing Ceremony**

Abstract of talks

PENCIL OF POLYNOMIALS AND THE PLANE JACOBIAN CONJECTURE

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The invertibility of polynomial maps $F = (P, Q)$ of \mathbb{C}^2 , $P, Q \in \mathbb{C}^2[x, y]$, can be characterized by the irreducibility of the polynomials $aP + bQ$ and the rationality of the curves $aP + bQ = 0$, $(a : b) \in \mathbb{P}^1$.

THE HOMOTOPY TYPE OF THE COMPLEMENT TO A SYSTEM OF
COMPLEX LINES IN \mathbb{C}^2

Nguyễn Việt Dũng
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(Joint work with Trần Quốc Công)

Using the braid monodromy presentation for the fundamental group of the complement to a system of complex lines in \mathbb{C}^2 , we suggest a CW-model for the homotopy type of that complement. We also discuss the minimality of this model using the discrete Morse Theory.

ON THE STABILITY OF HOLONOME SYSTEM

Nguyễn Tiên Đại
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Traditionally, the division theorem is closely related to the theory of stability of differential maps. The question on the stability is solved by using the method of linearisation. Main ingredient of it is to reduce the question on the stability to a linear problem of infinitesimal stability.

In this talk we would like to generalize this method in investigating the stability of micro-differential holonome systems.

MONOIDS IN THE FUNDAMENTAL GROUPS OF THE COMPLEMENT OF
LOGARITHMIC FREE DIVISORS IN \mathbb{C}^3

Ishibe Tadashi
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We study monoids generated by Zariski-van Kampen generators in the 17 fundamental groups of the complement of logarithmic free divisors in \mathbb{C}^3 listed by Sekiguchi. Four of them are neither Garside monoids nor Artin monoids. However, we introduce, similarly to Artin monoids, fundamental elements and also show their existence in these four cases. For one of the four non-Garside, we solve the word problem and the conjugation problem and we determine the centre of it and its growth function.

GENERIC BIFURCATIONS OF FRAMED CURVES AND
SINGULARITIES OF THEIR ENVELOPES

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The generic singularities and bifurcations are classified for one-parameter families of curves with frames. Two kinds of frames are considered, adapted frames and osculating frames, in terms of certain differential systems on flag manifolds.

FINITE SURGERIES ON THREE-TANGLE PRETZEL KNOTS

Ishikawa Masaharu
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In a joint work with D. Futer, Y. Kabaya, T. Mattman and K. Shimokawa, we proved that the only hyperbolic pretzel knots that admit non-trivial finite surgeries are $(-2, 3, 7)$ and $(-2, 3, 9)$. We used several techniques for proving this assertion, such as ideal triangulations, Culler-Shalen norms, and Newton polygons of A -polynomials. In this talk, I will give an overview of this problem and explain some of the ideas in our proof.

ON (2,3) TORUS DECOMPOSITIONS OF QL -CONFIGURATIONS

Kawashima Masayuki
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Let Q be a certain affine quartic which does not intersect transversely with the line at infinity. In this talk, we show the existence of a (2,3) torus decomposition of the defining polynomial of Q and its uniqueness except for one class.

ISOMORPHISM AMONG FAMILIES OF WEIGHTED K3 HYPERSURFACES

Kobayashi Masanori
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We discuss on the famous 95 families of simple K3 hypersurface singularities and construct an explicit identification among the families of K3 surfaces with a common Picard lattice.

A NEW EXAMPLE OF MEYER'S SECONDARY INVARIANT AND ITS
APPLICATION TO DEGENERATION OF CURVES

Kuno Yusuke
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We study a secondary invariant, called the Meyer function, on the fundamental group of the complement of the dual variety of a smooth projective variety. This invariant has played an important role when studying the local signatures of fibered 4-manifolds from a topological point of view. As an application of our study, we define a local signature for generic non-hyperelliptic fibrations of genus 4 and 5 and compute some examples.

THE DIMENSION OF TANGENT CONES AND
BI-LIPSCHITZ HOMEOMORPHISMS

Tạ Lê Lợi
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This talk gives some results in a joint work by Koike, Loi, Paunescu and Shiota.

Let $A \subset \mathbb{R}^n$ such that $0 \in \bar{A}$. Let $LD(A)$ denote the tangent cone of A at 0 . Let $h : (\mathbb{R}^n, 0) \rightarrow (\mathbb{R}^n, 0)$ be a homeomorphism or a bi-Lipschitz homeomorphism. We consider the relation between $LD(A)$ and $LD(h(A))$.

1. We give some examples to show that the dimension of the tangent cones is not a homeomorphic nor a bi-Lipschitzian invariant.
2. We prove that if h is a definable bi-Lipschitz homeomorphic germ and A is a definable germ, then there exists a definable bi-Lipschitz homeomorphism $\bar{h} : (\mathbb{R}^n, LD(A)) \rightarrow (\mathbb{R}^n, LD(h(A)))$.
3. To prove that bi-Lipschitz equivalence does not always imply definable one, we construct an example of two compact polyhedra that are bi-Lipschitz homeomorphic but not definably homeomorphic in any o-minimal structure.

We conclude the talk by a recent result:

4. Let R be a real closed field. Let A, B be definable set-germs at 0 in R^n in an o-minimal structure on R such that $0 \in \bar{A} \cap \bar{B}$. Let $h : (R^n, 0) \rightarrow (R^n, 0)$ be a bi-Lipschitz homeomorphism. Suppose that $h(A), h(B)$ are also definable. Then we have

$$\dim(LD(h(A)) \cap LD(h(B))) = \dim(LD(A) \cap LD(B)).$$

BERNSTEIN-SATO POLYNOMIAL AND APPLICATIONS

Trần Gia Lộc
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Let f be a germ of function belong $\mathbb{C}\{x_1, \dots, x_n\}$, and have an isolated singular at origin. In this paper we give some examples to show the relation between zeros of Bernstein-Sato polynomial and characteristic value of monodromy matrix of f . Using Bernstein-Sato polynomial we solve function equation of advanced Gamma function in case $f = z^n$.

PFAFFIAN SYSTEMS WITH GIVEN MONODROMY

Namba Makoto
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We discuss a method to construct Pfaffian systems (simultaneous homogeneous linear differential equations) with given discrete linear groups as monodromy.

ON THE TOPOLOGY OF POLYNOMIAL MAPPINGS FROM \mathbb{C}^N TO \mathbb{C}^{N-1}

Nguyễn Tất Thắng
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We consider a polynomial map from \mathbb{C}^n to \mathbb{C}^{n-1} and prove that if there exists a so called very good projection w.r.t. the value t^0 , then this value is an atypical value for the map if and only if the Euler characteristic of the fibres are not constant. We describe some topology of the fibers and prove that there is no an extension of the characterization of the atypical value via the Lojasiewicz number as in the case $n = 2$. (joint work with Ha Huy Vui)

HORIZONTAL GRADIENT OF POLYNOMIAL FUNCTIONS

Đinh Sỹ Tiệp
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We consider a class of splitting distributions which contains those of Heisenberg and Martinet, and study trajectories of sub-Riemannian (also called horizontal) gradient of polynomials. In this setting Łojasiewicz's gradient inequality does not hold and a trajectory of a horizontal gradient may be of infinite length, moreover it may accumulate on a closed curve. We show that these phenomena are exceptional; for a generic polynomial function the behavior of the trajectories of horizontal gradients are similar to the behavior of the trajectories of a Riemannian gradient.

If time permits, we will explain some developments of these results for some higher codimension distributions.

ON QUADRATIC RESIDUE CURVES

Tokunaga Hiroo

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Let $f : S \rightarrow P^2$ be a double cover of the projective plane with branch locus B . Let D be an irreducible curve on P^2 . We say B is quadratic residue with respect to D if $f^*D = D^+ + D^- + E$, where $D^+ \neq D^-$, $f(D^+) = f(D^-) = D$, and $f(E)$ is contained in the singular locus of B . In this talk, we consider some properties on quadratic residue curves and their application to branched covers.

ON μ AND RELATED TOPIC

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In the previous paper V. Nguyen-Khac, T. Shioda, On the Castelnuovo-Weil lattices. I, ASPM 50 (2008), 333-344) we introduce the concept of the Castelnuovo-Weil lattice for a curve C . There we discussed the question as to whether the minimal norm $\mu * C$ of this lattice is equal to $2g(C)$.

In this talk I discuss the problem of estimating $\mu(C)$ related to the question which curves can appear in an abelian variety.

LOJASIEWICZ INEQUALITY AT INFINITY FOR POLYNOMIALS
IN TWO REAL VARIABLES

Hà Huy Vui
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(Joint work with Nguyễn Hồng Đức)

We propose different types of Lojasiewicz inequality at infinity for polynomials in two variables. The formulas for the Lojasiewicz exponents are given.

MINIMAL PRESENTATIONS FOR THE FUNDAMENTAL GROUPS OF THE
COMPLEMENT OF HYPERPLANE ARRANGEMENTS

Yoshinaga Masahiko
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We will discuss presentations for the fundamental group arising from minimal CW decomposition which has been recently studied.

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