Preface

The present issue of Advanced Studies in Pure Mathematics constitutes the proceedings of the first of the two consecutive meetings held in Sapporo and Tokyo in July 1998. The idea of organizing an event on singularities and arrangements of hyperplanes came up in an informal discussion in 1996 of Jean-Paul Brasselet (IML, CNRS, Marseille), Mutsuo Oka (TMU, Tokyo), Kyoji Saito (RIMS, Kyoto), Tatsuo Suwa (Hokkaido University) and Hiroaki Terao (TMU, Tokyo). It was decided to have not one but two consecutive conferences in Sapporo and Tokyo, in order to express the relation between France and Japan in the domain of singularities on one hand and to commemorate the sixtieth birthyear of Peter Orlik on the other hand.

This project had been realized as the international symposium "Singularities in Geometry and Topology" and "Workshop on Mathematics Related to Arrangements of Hyperplanes". The former is an expansion of the Franco-Japanese Seminar supported by CNRS and JSPS and was organized by J.-P. Brasselet and T. Suwa. The latter was organized by M. Oka and H. Terao with Michael Falk (Northern Arizona University) and Richard Randell (University of Iowa) as the program committee.

These two events have strong relationship. First of all, singularities and arrangements of hyperplanes are closely related from the mathematical viewpoint - the subjects studied and the tools used in the two theories are often the same; hypergeometric functions, singular de Rham complexes, resolution of singularities and Milnor fibration, to name a few. In fact, many mathematicians participated in the two conferences and some of them gave talks in both. Thus our original intention was to publish one joint volume as the proceedings of these two meetings. However, due to the page restriction, we had to publish in two separate volumes. We should mention that the proceedings of the other meeting will also be published in the series of Advanced Studies in Pure Mathematics.

The international symposium on "Singularities in Geometry and Topology" took place at Hokkaido University, Sapporo, July 6 - 10, 1998. There were sixty-eight participants, mostly from Japan and France but also from other countries including China, Mexico, Poland, Spain and USA. There were twenty-two lectures, whose main topics are singularities of curves, characteristic classes of singular varieties, $\mathcal{D}$-modules, motives, resolution of singularities, Milnor fibration, Enriques diagrams, Hilbert schemes and log-canonical singularities.

We briefly review the contents of the articles included in this volume. Singularities of curves are presented in various aspects: Mutsuo Oka gives properties of dual curves and dual singularities in particular geometry of cuspidal sextics and their dual curves. Antonio Campillo and Jorge Olivares study curves invariant by singular foliations on algebraic varieties and Poincaré-Hopf type formula, the paper of Hiro-o Tokunaga describes local types of singularities of plane curves and the topology of their complement.

Several papers are on the recent development about characteristic classes for singular varieties and, in particular, the so-called Milnor classes. It was remarked by José Seade and Tatsuo Suwa that, in the case of local complete intersections with isolated singularities, the difference between the Chern-Schwartz-MacPherson class and the virtual class is equal to the sum of Milnor numbers at the singular points. In the case of local complete intersections with arbitrary singularities, the difference is a homology class supported on the singular set and is called the Milnor class. The paper by Jean-Paul Brasselet gives a general history of characteristic classes for singular varieties, including a brief account of recent works of P. Aluffi, J.-P. Brasselet - D. Lehmann - J. Seade - T. Suwa, A. Parusiński - P. Pragacz and S. Yokura on Milnor classes. Paolo Aluffi gives an expression of Milnor classes for hypersurfaces in terms of Segre classes and defines the weighted Chern-Mather classes. Daniel Lehmann defines Milnor classes for local complete intersections in terms of Chern-Weil theory. Shoji Yokura, with Jean-Paul Brasselet, describe the behavior of Milnor classes in bivariant theory. Tatsuo Suwa defines characteristic classes of coherent sheaves on local complete intersections and gives a simple proof of the Riemann-Roch theorem for embeddings, which is used to compute these classes, in particular for the tangent sheaf. Isao Nakai proves the naturality of Stiefel-Whitney classes for singular maps using the Morin mappings.

Joël Briançon, Philippe Maisonobe and Michel Merle give a survey on characteristic varieties of $\mathcal{D}$-modules and singularities, in particular the relation with the conormal space and polar varieties. François Loeser justifies the use of motives to study the Milnor fiber, also the motivic Igusa integrals and the vanishing cycles. Shihoko Ishii studies quotients of isolated log-canonical singularities in detail. In particular, she determines all possible indices of such singularities in dimension three. The geometry of normal singularities is the theme of the Lê Dũng Tráng's paper, looking from various viewpoints: resolution of singularities, local link and so forth. Gérard Gonzalez-Sprinberg introduces the notions of

constellations of infinitely near points, toric constellations and toric Enriques diagrams. The paper of Vincent Blanloeil is devoted to a theory of cobordism for non-sperical links.

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