Abstracts

Martin Deraux, Université de Grenoble I, France

Tautological maps between Deligne-Mostow ball quotients

I will briefly recall the Deligne-Mostow construction of lattices acting on the ball, and describe a natural way to construct holomorphic maps between some of these ball quotients of various low dimension.

Lawrence Ein, University of Illinois, Chicago, USA

Extension theorem for log-pairs

This is joint work with Mihnea Popa. We prove a stronger version of the extension theorem due to Hacon and McKernan. One can use this result to give a simpler proof for Hacon and McKernan's theorem on the existence of flips. The basic ideas of the proof came from Siu's argument for the invariance of plurigenera.

Jaehyun Hong, Seoul National University, Korea

Characterization of the rational homogeneous space associated to a long root

After a series of works done by Hwang and Mok, it is generally believed that the complex geometry of the Fano variety can be determined by the projective geometry of the variety of minimal rational tangents. In this talk, we will show that a Fano variety X of Picard number 1 is biholomorphic to a rational homogeneous space $S = G/P$ associated to a long root, if the variety of minimal rational tangents at a general point in X is isomorphic to the variety of minimal rational tangents at a general point in S. This is a joint work with J.-M. Hwang.

Dano Kim, University of Chicago, USA

L^2 extension of adjoint line bundle sections

We will discuss an L^2 extension theorem of Ohsawa-Takegoshi type which extends line bundle sections from a subvariety Z of general codimension to its ambient projective variety X. Our setting is to have Z as a log-canonical center, that is, a locus of non-integrable singularity of an adjoint line bundle on X. Such a setting is natural both for application to algebraic geometry and for the general methods to prove L^2 extension of line bundle sections.

Vincent Koziarz, Université de Nancy, France

The Toledo invariant on smooth varieties of general type

The Toledo invariant was originally defined for representations of cocompact lattices of $SU(m, 1)$ in $SU(n, 1)$. First, I will explain how to extend the definition of this invariant to representations of fundamental groups of smooth varieties of general type in $SU(n, 1)$. Then, I will prove that the invariant is bounded by the volume of the canonical bundle of the variety and that if equality is achieved, the canonical model of the variety is smooth and uniformized by the complex unit ball. This is a joint work with Julien Maubon.

Tuen Wai Ng, HKU, Hong Kong

Meromorphic solutions of higher order Briot–Bouquet differential equations

In this talk, we shall prove the following result. Let y be a meromorphic function with at least one pole in the plane and y is neither elliptic nor degenerated elliptic. Then y and $y^{(k)}$ are algebraically independent. This solves an old problem of Eremenko on higher order Briot–Bouquet differential equations. This is a joint work with A. Eremenko and L.W. Liao.

Yum-Tong Siu, Harvard University, USA

Effectiveness of Jacobian Determinant Algorithm and PDE Estimates

In the application of algebraic geometric methods to PDE, the derivation of a priori estimates is reduced to a problem of effectiveness of an algorithm involving Jacobian determinants. We will discuss and give a proof for the effectiveness of the algorithm.

Wing Keung To, National University of Singapore

Negatively curved Kähler metrics on Kodaira surfaces

In this talk, I will describe a recent joint work with Sai-Kee Yeung on constructing a Kähler metric of negative holomorphic bisectional curvature on any compact complex surface which admits a Kodaira fibration.

Jonathan Tsai, CUHK, Hong Kong

A Schwarz-Christoffel formula for covering maps of Riemann surfaces

The famous Schwarz-Christoffel formula is a formula for calculating the conformal map of the unit disc onto a domain bounded by a polygon in the complex plane. In this talk, we will discuss a generalization of the Schwarz-Christoffel formula to domains bounded by trajectory arcs of certain quadratic differentials. Then we will see that, by defining suitable quadratic differentials on the covering space of a Riemann surface, we will obtain a version of the Schwarz-Christoffel formula for covering maps on Riemann surfaces. We will then discuss some applications of this result.

Claire Voisin, IHES & CNRS, France

Coniveau 2 complete intersections and cones of effective cycles

The coniveau of a Hodge structure is the smallest r for which an $L^{p,r}$-component of the Hodge decomposition is non trivial. The coniveau of the Hodge structure on cohomology of a projective manifold is supposed to have a geometric interpretation via the generalized Hodge-Grothendieck conjecture. For complete intersections in projective space, the coniveau can be computed usng Griffiths theory of residues. The numerical characterization of coniveau 1 complete intersections is obvious: they are the Fano complete intersections. For coniveau 2, we give here a geometric interpretation of the numerical characterization, involving the geometry of their varietes of lines.
We show that the generalized Hodge-Grothendieck conjecture for them would then be a consequence of knowing that a certain algebraic class on the variety of lines is "big", that is, in the interior of the effective cone.

Sai-Kee Yeung, Purdue University, USA

Fake compact Hermitian symmetric spaces

A compact locally Hermitian symmetric space of non-compact type is said to be a fake compact Hermitian symmetric space if it has the same Betti numbers as its compact dual. The simplest examples are fake projective planes in complex dimension two. In this talk we will explain some joint work with Gopal Prasad on classification and constructions of fake compact Hermitian symmetric spaces. We will also explain some related problems and applications.

Yongcheng Yin, Fudan University, China

Proof of the Branner-Hubbard conjecture and applications

By means of a nested sequence of some critical pieces constructed by Kozlovski, Shen, and van Strien, and by using a covering lemma recently proved by Kahn and Lyubich, we prove that a component of the filled-in Julia set of any polynomial is a point if and only if its forward orbit contains no periodic critical components. It follows immediately that the Julia set of a polynomial is a Cantor set if and only if each critical component of the filled-in Julia set is aperiodic. This result was a conjecture raised by Branner and Hubbard in 1992. Some applications will also be given.