Frontiers of Mathematics Lecture

Methods of Rational Curves and Pluricanonical Bundles in Complex Geometry

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Venue : Lecture Theatre C, LG1/F, Chow Yei Ching Building, The University of Hong Kong

Abstract

The uniformation theorem of the trichotomy of a simply connected Riemann surface into the sphere, the plane, and the disk has been motivating a great deal of trailblazing research in complex geometry of many variables; for example, the rigidity theory for a compact complex manifold to be biholomorphic to, or mapped by special maps into, symmetric or locally symmetric manifolds. In this lecture, for the direction of generalizing the sphere from one to many variables, we discuss the method of rational curves and, in particular, a new approach to the conjecture of the nonexistence of complex structure for the 6-sphere by deforming the 8-real-parameter family of criss-crossing holomorphic rational curves in the standard almost complex structure defined by the imaginary octonians of unit length. This is analogous to using rational curves to study the nondeformability of irreducible compact Hermitian symmetric manifolds.

For the direction of generalizing the disk from one to many variables, we discuss the method of pluricanonical bundles. In particular, we introduce the pluricanonical Jacobians of compact Riemann surfaces as pluricanonical analogues of Jacobian varieties. We also use the techniques of Nevanlinna theory and Gelfond-Schneider to study the abundance conjecture which concludes the abundance of pluricanonical sections from the abundance of ample-line-bundle-twisted pluricanonical sections.

In the lecture we will start from scratch with the background and motivation for the topics being discussed.

Biography

Professor Yum-Tong Siu is currently William Elwood Byerly Professor of Mathematics, Harvard University. He was an Alfred P. Sloan Fellow (1971-1973) and a Guggenheim Fellow (1986). He joined Harvard University in 1982 and served as Chairman of the Department from 1996 to 1999. Over the years during his career, he has held Visiting Professor positions in many well-known institutions around the world. Professor Siu has been a prominent figure in the field of several complex variables for several decades. He has mastered techniques at the interface among complex variables, differential geometry, and algebraic geometry. By applying estimates of the complex Neumann problem and the theory of multiplier ideal sheaves to algebraic geometry, he has solved various important conjectures. He gave invited addresses at three International Congresses of Mathematicians, two of which are plenary addresses (Helsinki, 1978; Warsaw, 1983; Beijing, 2002). For his significant contributions to Several Complex Variables, he was awarded the Stefan Bergman Prize by the American Mathematical Society in 1993. Other academic honours include: honorary doctorates awarded by University of Hong Kong, University of Bochum (Germany), and University of Macau; Corresponding Member of the Göttingen Academy of Sciences; Foreign Member of the Chinese Academy of Sciences; Fellow of the American Academy of Arts & Sciences, Member of the National Academy of Sciences, Member of Academia Sinica, and Member of the Academy of Sciences of Hong Kong.