THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

Geometry Seminar

Transcendental Morse Inequalities for Differences of Two Nef Classes

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Abstract

Let X be an n-dimensional compact Kähler manifold. Given two nef cohomology classes $\{\alpha\}$ and $\{\beta\}$ of bidegree $(1, 1)$ such that the intersection number $\alpha^n - n\alpha^{n-1} \cdot \beta$ is positive, we prove the existence of a Kähler current T in the difference cohomology class $\{\alpha - \beta\}$. This answers affirmatively the qualitative part of Demailly's Transcendental Morse Inequalities Conjecture for this context. The approach starts from an idea of Chiose, also used by Xiao, based on Lamari's positivity criterion asserting the duality between the closure of the Gauduchon cone of X (that we introduced in 2013) and Demailly's pseudo-effective cone. We introduce a new technique of handling the estimates in a certain Monge-Amère equation.

We shall then go on to explain our approach to the quantitative part of the conjecture and the results we obtained in this direction. Two new ideas are introduced: certain pointwise inequalities between products of positive $(1, 1)$-forms and an approximate fixed point technique for Monge-Ampère equations.

If time permits, we shall also explain a possible extension of this conjecture to the non-Kähler context. If successful, it should prove that every $\partial\bar{\partial}$-manifold carries a balanced metric, as we conjectured in 2015.

> Date: July 14, 2016 (Thursday)
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> Time: 4:00 – 5:00pm
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> Place: Room 210, Run Run Shaw Bldg., HKU

All are welcome