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Geometric substructures, uniruled projective subvarieties, and applications to Kähler geometry

Monday, December 11, 2017 2:00 PM (50 minutes)

In a series of articles with Jun-Muk Hwang starting from the late 1990s, we introduced a geometric theory of uniruled projective manifolds based on the variety of minimal rational tangents (VMRT), i.e., the collection of tangents to minimal rational curves on a uniruled projective manifold (X;K) equipped with a minimal rational component. This theory provides differential-geometric tools for the study of uniruled projective manifolds, especially Fano manifolds of Picard number 1. Associated to (X;K) is the fibered space π:C(X)⟶X of VMRTs called the VMRT structure on (X;K). I will discuss germs of complex submanifolds S on (X;K) inheriting geometric substructures, to be called sub-VMRT structures, obtained from intersections of VMRTs with tangent subspaces, i.e., from ϖ : C(S) ⟶S, C(S) := C(X) \ PT(S). Central to our study is the characterization of certain classical Fano manifolds of Picard number 1 or special uniruled projective subvarieties on them in terms of VMRTs and sub-VMRTs. As applications I will relate the theory to the existence and uniqueness of certain classes of holomorphic isometries into bounded symmetric domains. For uniqueness results parallel transport (holonomy), a notion of fundamental importance both in Kähler geometry and in the study of sub-VMRT structures, will play an important role.

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