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Geometry of Holomorphic Maps into Bounded Symmetric Domains

Consider bounded symmetric domains $D \Subset \mathbb{C}^n$ and $\Omega \Subset \mathbb{C}^N$ in their Harish-Chandra realizations. In this talk we will discuss recent work on germs of holomorphic maps $f : (D; 0) \rightarrow (\Omega; 0)$ with special geometric properties such as holomorphic isometries and measure-preserving holomorphic maps. By means of analytic continuation they lead eventually to the study of asymptotic behavior of holomorphic embeddings defined on a neighborhood of a regular boundary point of D , especially in the case where D is the unit disk and Ω is an irreducible bounded symmetric domain.

Our discussion will involve (a) extension results on germs of holomorphic isometries between bounded domains with algebraic Bergman kernels, such as bounded symmetric domains; (b) holomorphic isometries of the unit disk into bounded symmetric domains: asymptotic behavior and construction of examples; (c) characterization of measure-preserving algebraic correspondences as modular correspondences: solution of a problem raised by Clozel-Ullmo (joint work with Sui-Chung Ng). Our methods incorporate techniques in Several Complex Variables, while we exploit at the same time particular features of Bergman metrics on bounded symmetric domains. Especially, there is an interesting geometry for holomorphic curves on bounded symmetric domains of higher rank due to the lack of homogeneity in the space of tangent vectors. We study holomorphic curves on them by means of normal forms of tangent vectors and moving families of maximal polydisks.