

abstract

COMPLEX GEOMETRY SEMINAR

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

Let $f: X \rightarrow Y$ be a projective map, and assume for simplicity X to be smooth. The Decomposition Theorem of Beilinson, Bernstein, Deligne and Gabber states that the (derived direct image of the constant sheaf \mathbf{Q}_X is isomorphic to a direct sum of shifted intersection cohomology complexes of local systems. In the talk I will describe a recent proof of the theorem for complex varieties, developed by M.A. de Cataldo and myself (preprint math.AG/0306030 version 2), based on classical Hodge Theory. In this approach a major role is played by a series of "intersection forms along the strata" which are naturally associated to f , and the Decomposition Theorem is shown to be equivalent with their non-degeneracy. We show that these forms are in fact definite, a generalization of Grauert criterion for contractibility of curves on a surface. This result is achieved by studying the nilpotent endomorphism on the rational cohomology of X given by the cup product with the pullback of an ample line bundle on Y , and relating its Jordan canonical form to the topology of the map. In the talk I will illustrate how this approach works on some lower dimensional geometric examples, especially contractions, where this sort of "Decomposition Theorem with signs" seems to carry interesting geometric information.