The geometry of holomorphic and algebraic curves in
complex algebraic varieties
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Deformations of schemes and curves on varieties

Ziv Ran
Department of Mathematics
University of California Riverside
900 Big Spgs Rd
Riverside, CA 92521
USA
ziv@math.ucr.edu

Abstract

Deformation theory has long been an effective tool in the study of curves on smooth varieties; the theory of rational connectedness is just one example. Extensions of these results to the singular case have long been sought.

In this talk we describe a comprehensive approach to deformation theory of complex algebraic schemes (and anaytic spaces) their morphisms, and other algebro-geometric and analytic objects, a theory that might be capable of delivering the sought-for applications in the study of curves on singular varieties. Our approach is based on associating to a geometric object, such as a scheme of map of such, an approriate Lie-theoretic object such as a differential graded Lie algebra, a pair of such or, most generally, a semi-simplicial Lie algebra (SELA). We show how to associate a tangent SELA to a complex algebraic scheme. We introduce a notion of Jacobi-Bernoulli cohomology associated to a SELA. For a complex algebraic scheme X, we show that the Jacobi-Bernoulli cohomology of the tangent SELA of X is related to (arbitrary-order) infinitesimal deformations of X.A similar result holds for maps of schems, subschems of a fixed scheme, sheaves (on a fixed or variable scheme), and many other gemoetric objects.