

REES ALGEBRAS OF LINEARLY PRESENTED IDEALS

ALESSANDRA COSTANTINI

ABSTRACT. The Rees algebra of an ideal I is an invaluable tool in the study of the algebraic properties of the ideal I , as it encodes information on the asymptotic growth of its powers I^j . Moreover, as Rees algebras arise as homogeneous coordinate rings of blowups, they represent an essential tool in the study of singularities of algebraic varieties. In this talk, I will discuss the fundamental problem of finding the implicit equations of blowups, which are usually defined geometrically via parametric equations. Equivalently, one aims to express the Rees algebra as a quotient of a polynomial ring, which a priori requires one to determine all possible relations among the generators of all powers of the given ideal. This is difficult in general, so I will restrict to the particular case when I is a codimension-two perfect ideal in a polynomial ring, admitting a presentation matrix with linear entries. This is part of joint work with Edward Price and Matthew Weaver, available online at <https://arxiv.org/pdf/2308.16010.pdf>.