

1059-13-69

**Yu Xie\*** (yxie@nd.edu), South Bend, IN 46637. *Formulas for the multiplicity of graded algebras.*

We generalize a formula by Simis, Ulrich and Vasconcelos about homogeneous inclusions of standard graded Noetherian algebras over an Artinian local ring. The main application of this formula is to compute the multiplicity for special fiber rings of homogeneous ideals. In algebraic geometry, the special fiber ring of a homogeneous ideal describes the homogeneous coordinate ring of the image of the rational map induced by this ideal. As a special case this construction yields homogeneous coordinate rings of Gauss images and of secant varieties. It is important to compute the multiplicity of the special fiber ring. Our formula can be used to find the multiplicity for any such special fiber rings. In particular, it gives the degree of dual varieties of any hypersurfaces and a generalization of Teissier's Plücker formula to hypersurfaces with non-isolated singularities. The first formula relating the degree of the dual variety to the degree of the variety itself was given by Plücker in 1834 for complex plane curves. Many generalizations for this formula were made after that. All the existing results require the variety has non-deficient dual (i.e., the dual variety is a hypersurface). In our formula, we do not need to assume the dual variety is a hypersurface. (Received February 15, 2010)