



## سمینار هفتگی جبر جابه جایی

(بهار ۱۳۹۵)

Associated primes of powers of monomial ideals under monomial operators ۹۵،۲،۹

مهرداد ناصرزاد،

پژوهشگاه دانشهای بنیادی

Abstract

Let  $R$  be a commutative Noetherian ring and  $I$  an ideal of  $R$ . Brodmann proved that the sequence  $\{Ass_R(R/I^k)\}_{k \geq 1}$  of associated prime ideals is stationary for large  $k$ . Many problems arise in the context of Brodmann's result. We say an ideal  $I \subset R$  has the persistence property (respectively, strong persistence property) if  $Ass_R(R/I^k) \subseteq Ass_R(R/I^{k+1})$  (respectively,  $(I^{k+1} :_R I) = I^k$ ) for all  $k$ . Also an ideal  $I \subset R$  is called normally torsion-free if  $Ass_R(R/I^k) \subseteq Ass_R(R/I)$  for all  $k$ . Now, let  $R = K[x_1, \dots, x_n]$  be a polynomial ring over a field  $K$ , and  $I$  a monomial ideal of  $R$ . Furthermore, there are several monomial operators such as expansion operator, weight operator, multiple operator, polarization operator, and contraction operator. In this talk, we focus on some of these operators, and investigate the persistence property (respectively, strongly persistence property, and normally torsion-freeness) under these monomial operators.

Almost gorenstein rings: origin and methods ۹۵،۲،۳۰ و ۲۳

مهران رحیمی،

دانشگاه خوارزمی

Abstract

The notation of almost Gorenstein rings introduced by V. Barucci and R. Froberg in 1997 for one-dimensional analytically unramified local rings. For some technical reasons S. Goto, N. Matsuoka and T. T. Phuong gave the definition for arbitrary one-dimensional local rings in 2013. Finally in 2015 definition of higher dimensional almost Gorenstein local/graded rings was given by S. Goto, R. Takahashi and N. Taniguchi. In this talk, we consider about origin, definition and important facts and results about almost Gorenstein rings and some important methods to find them.

The fundamental theorem of tropical differential algebraic Geometry ۹۵،۳،۱۳

زینب طوقانی،

دانشگاه ملی مکزیک

Abstract

Let  $I$  be an ideal of the ring of Laurent polynomials  $K[x_1^{\pm 1}, \dots, x_n^{\pm 1}]$  with coefficients in a real-valued algebraically closed field of characteristic zero  $(K, v)$ . The fundamental theorem of tropical algebraic geometry states the equality  $\text{trop}(V(I)) = V(\text{trop}(I))$  between the tropicalization of the variety  $V(I) \subseteq (K^*)^n$  and the tropical variety associated to the tropicalization of the ideal  $I$ . We extended an analogous result for a differential ideal  $G$  of the ring of differential polynomials  $K[[t]]\{x_1, \dots, x_n\}$ , where  $K$  is an algebraically closed field of characteristic zero. We defined  $\text{trop}(\text{Sol}(G))$  the tropicalization of  $\text{Sol}(G) \subset K[[t]]^n$  the set of solutions of  $G$ , and  $\text{Sol}(\text{trop}(G)) \subset \mathcal{P}(\mathbb{Z}_{\geq 0})^n$  the set of solutions associated to  $\text{trop}(G)$  the tropicalization of the ideal  $G$ . We showed the equality  $\text{trop}(\text{Sol}(G)) = \text{Sol}(\text{trop}(G))$ .

Golod rings ۹۵،۳،۲۰

رسول آهنگری،

پژوهشگاه دانشهای بنیادی

Abstract

Golod rings are a class of good rings, in the sense that all finitely generated modules over such rings have rational Poincaré series sharing a common denominator. In this lecture, we will talk about Golod rings.

Associated primes and syzygies of linked modules ۹۵،۳،۲۷

محمدتقی دیبایی،

پژوهشگاه دانشهای بنیادی و دانشگاه خوارزمی

Abstract

Motivated by the notion of geometrically linked ideals, we show that over a Gorenstein local ring  $R$ , if a Cohen-Macaulay  $R$ -module  $M$  of grade  $g$  is linked to an  $R$ -module  $N$  by a Gorenstein ideal  $c$ , such that  $Ass_R(M) \cap Ass_R(N) = \emptyset$ , then  $M \otimes_R N$  is isomorphic to direct sum of copies of  $R/\mathfrak{a}$ , where  $\mathfrak{a}$  is a Gorenstein ideal of  $R$  of grade  $g + 1$ . We give a criterion for the depth of a local ring  $(R, \mathfrak{m}, k)$  in terms of the homological dimensions of the modules linked to the syzygies of the residue field  $k$ . As a result we characterize a local ring  $(R, \mathfrak{m}, k)$  in terms of the homological dimensions of the modules linked to the syzygies of  $k$ .

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مکان: میدان شهید باهنر، پژوهشگاه دانشهای بنیادی  
سالن شماره ۱