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## Notation and Terminology

$\bar{A}$	integral closure of the affine algebra $A$
$\text{ann}(E)$	annihilator of the module $E$
$a(G)$	$a$ -invariant of the graded ring $G$
$\text{bdeg}(E)$	a cohomological degree of the module $E$ , 159
$\text{bigrank}(E)$	bigrank of the module $E$ , 73
$\text{bigr}(I)$	big reduction number of the ideal $I$ , 75
$\text{br}(E)$	Buchsbaum-Rim multiplicity of the module $E$ , 422
$\mathfrak{c}(A)$	conductor of the algebra $A$ , 318
C.I.	complete intersection
C-M	Cohen-Macaulay
$\text{Deg}(E)$	a cohomological degree of the module $E$ , 140
$\det(E)$	determinant of the module $E$ , 71, 439
$\det_0(E)$	order determinant ideal of the module $E$ , 439
$\text{codim}E$	codimension of the module $E$
$\text{deg}(E)$	multiplicity of a graded module
$\text{depth } E$	depth of the module $M$ relative to the maximal ideal
$\dim E$	Krull dimension of a module
$E^*$	dual of the $R$ -module $E$ , $E^* = \text{Hom}_R(E, R)$
$\bar{E}$	integral closure of the $R$ -module $E$
$E[-a]$	shift of a graded module, $E[-a]_n = E_{n-a}$
$e(\text{gr}_I(R))$	multiplicity of the ring $\text{gr}_I(R)$
$e(I)$	multiplicity of a primary ideal of a local ring
$\text{embdim}(A)$	embedding dimension of the affine algebra $A$ , 348
$\text{embdeg}(A)$	embedding degree of the graded algebra $A$ , 349
$F_s(E)$	Fitting ideal of the module $E$
$\text{Fitt}_s(E)$	Fitting ideal of the module $E$
$\Gamma_I(E)$	0th local cohomology module of $E$ relative to $I$
$\text{gr}_I(R)$	associated graded ring of the ideal $I$ , 7
$H_A(t)$	Hilbert series of the graded algebra $A$
$h(A)$	$h$ -vector of the graded algebra $A$ , 100

$\text{hdeg}(A)$	homological degree of the module $A$ , 141
$\text{hdeg}_J(A)$	homological degree of the module $A$ relative to $J$ , 142
$\text{height } I$	height of the ideal $I$
$\bar{I}$	integral closure of the ideal $I$ , 33
$I^{(n)}$	$n$ th symbolic power of the ideal $I$
$I_t(\varphi)$	ideal generated by the $t \times t$ minors of the matrix $\varphi$
$\lambda(E)$	length of a module with a composition series
$\ell(E)$	analytic spread of a module over a local ring, 45
$\mathcal{M}(I; R)$	$\mathcal{M}$ -complex of the ideal $I$ , 294
$\text{nil}(I)$	index of nilpotency of the ideal $I$ , 121
$\nu(E)$	minimal number of generators of the module $E$
$\text{proj dim } E$	projective dimension of the module $E$
$Z(I; R)$	$Z$ -complex of the ideal $I$ , 294
$\omega_R$	canonical module of the ring $R$
$\mathcal{R}(E)$	Rees algebra of the module $E$ , 9
$\mathfrak{r}(I)$	reduction number of the ideal $I$ , 54
$\text{reg}(E)$	Castelnuovo-Mumford regularity of the module $E$ , 130
$\mathfrak{r}_J(I)$	reduction number of the ideal $I$ relative to $J$ , 32
$\text{tn}(E)$	tracking number of a module or algebra, 337
$V(I)$	closed set of $\text{Spec}(R)$ defined by $I$

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