

Notation Index

- $\bigwedge^i E$, 1
- $\bigwedge^i \phi$, 2
- $S_r E$, 3
- $S_r \phi$, 4
- $D_r E$, 6
- $D_r \phi$, 7
- λ , 8
- $(a_1, \dots, a_r | b_1, \dots, b_r)$, 9
- $\lambda', \lambda/\mu$, 9
- $RST(\lambda/\mu, A)$, $CST(\lambda/\mu, A)$, $ST(\lambda/\mu, A)$, 10
- \leq , 11
- T^\bullet, ω_X , 21
- $\det(V_\bullet)$, 27
- $L_\lambda E$, 32
- $R(\lambda, E)$, $R_{a,a+1}(E)$, 32
- ϕ_λ , 37
- $\phi_{\lambda/\mu}$, 39
- $L_{\lambda/\mu} E$, 41
- $R(\lambda/\mu, E)$, 41
- $\psi_{\lambda/\mu} E$, 43
- $K_{\lambda/\mu} E$, 44
- $U(\lambda/\mu, E)$, $U_{a,a+1}(E)$, 44
- $K_\lambda E$, 46
- T, U**, 50, 123
- c_λ , 52
- \hat{c}_λ , 53
- $M_\lambda E$, 54
- $\text{char}(V)$, 55
- $v(\mu, \nu, \lambda)$, 60
- $u(\lambda, \mu; \nu)$, $P(\lambda, \mu; \nu)$, 61
- VS, HS , 62
- $w(\nu/\mu; \lambda)$, 62
- $Q_1(m)$, $Q_{-1}(m)$, 65
- $\bigwedge^i \Phi$, $S_i \Phi$, 67
- $L_{\lambda/\mu} \Phi$, $R(\lambda/\mu, \Phi)$, 69
- $H_{\lambda/\mu}$, 70
- S^λ , 81
- $\text{Grass}(r, E)$, 85
- $\text{Flag}(E)$, 88
- $\text{Flag}(b_1, \dots, b_r; E)$, 90
- ζ_s , 94
- ζ_λ , 95
- ζ'_s, ζ'_λ , 96
- \mathcal{R} , 99
- \mathcal{Q} , 100
- $\mathcal{K}_\bullet(\mathcal{Q}^*)$, 100
- $\mathcal{R}_i, \mathcal{Q}_{n-i}$, 103
- $\text{Grass}(r, \mathcal{E})$, 103
- $\text{Flag}(\mathcal{E})$, $\text{Flag}(b_1, \dots, b_r; \mathcal{E})$, 104
- $\text{IGrass}(r, F)$, 104–05
- $\mathcal{L}(\alpha)$, 112
- $\sigma^*(\alpha)$, 112
- $\mathcal{V}(\alpha)$, 114
- G, B, W, $\Phi, \Lambda, \Lambda^+, \sigma^*(\gamma)$** , 123
- \mathcal{R}^\vee , 126, 128, 131
- $\mathcal{K}(\xi)_\bullet$, 137
- $\mathcal{K}(\xi, \mathcal{V})_\bullet$, 138
- $F(\mathcal{V})_\bullet$, 138
- F_\bullet , 139
- \mathcal{V}^\vee , 139
- $SI(\mathbf{H}, U)$, 155
- Y_r, I_{r+1} , 160
- Ev, Tr , 167
- Y_r^s, I_{r+1}^s , 175
- $Q_s(m)$, 175
- Y_r^a, I_{2u+2}^a , 187
- EV , 193
- TR , 194
- $\mathcal{M}(\alpha, \beta)$, $\mathcal{N}(\alpha, \beta)$, $\mathcal{P}(\alpha, \beta)$, 194–95
- $M(\alpha, \beta)$, $N(\alpha, \beta)$, $P(\alpha, \beta)$, 195
- A_r , 195
- $K'_0(A_r)$, 196
- A_r^s , 210
- $K'_0(A_r^s)$, 210
- $\mathcal{M}^s(\alpha)$, $M^s(\alpha)$, 210
- A_r^a , 214
- $K'_0(A_r^a)$, 214
- $\mathcal{M}^a(\alpha)$, $M^a(\alpha)$, 214
- Y_r^λ , 228
- I_r^λ , 229
- $O(\mu)$, Y_μ , 253
- $\mathcal{K}(\xi_\mu)_\bullet, F^\mu_\bullet$, 254
- G_i^μ , 256

368

Notation Index

J_μ , 263	$EC(d)$, 287
$U_{i,p}, V_{i,p}$, 264	$P_S(n)$, 297
J'_μ , 266	$EP(d)$, 299
$F^\mu(Q, Q^*), F^\mu(Q, Q^*)_\bullet$, 267	$\nabla_{Y'}$, 314
W_μ , 268	$Res(Y')$, 315
g , 278	$\nabla_{\mathbf{p}'}$, 318
$\bar{P}_o(n)$, 284	$F(m)_\bullet$, 318
$C(\mu), Y_\mu$, 284, 297	Y^\vee, Δ_Y , 328

Subject Index

- algebra, exterior, 3
 algebra, symmetric, 5
 algebra, divided power, 7
 Auslander-Buchsbaum formula, 14, 16
 Auslander-Buchsbaum-Serre theorem, 15
 arm length, 8
 arm, of a box, 8
- Basic theorem, 138
 Basic Theorem for Discriminants, 329
 Basic Theorem for nilpotent orbits, 254
 Basic Theorem for Resultants, 316
 Bezout's expression for resultant, 317
 binary forms, 157–58
 binary forms with p -tuple roots, 157–58
 Bondal's expression for hyperdeterminant, 344
 Bondal's expression for hyperdeterminant, generalized, 346
 Bott's algorithm, 113
 Bott's theorem, 113, 123, 133
 Bott's theorem for partial flag variety, 114
 Brauer-Klimyk formula, 134–35
 Buchsbaum-Eisenbud acyclicity criterion, 18
 Buchsbaum-Eisenbud complex, 192
 Buchsbaum-Eisenbud structure theorem, 31
- canonical bundle, on a flag variety, 109
 canonical module, 21
 canonical sheaf, 21
 Cartan piece of a tensor product, 82
 Cauchy formulas, 59–60, 95–6, 106
 character, of a representation, 55
 Chow cycle, 315
 Chow form, 315
 codimension, of a module, 13
 Cohen-Macaulay complex, 140
 Cohen-Macaulay module, 14
 Cohen-Macaulay module, maximal, 14, 223–24
 Cohen-Macaulay ring, 14, 17
 Cohen-Macaulay sheaf, 24
- compactification, of a morphism, 22
 complete intersection, 13
 complex, minimal, 17
 condition LP, 61
 conjugacy classes, for $GL(E)$, 253
 conjugacy classes, for $\underline{so}(F)$, 284
 conjugacy classes, for $\underline{sp}(F)$, 297
- d -tuple embedding of projective space, 236
 degeneration sequence, 154–56
 degree, of line bundle, 117
 deJong-Grauert-Remmert algorithm, 19, 350–53
 Demazure pairing, 118
 depth, of a module, 12
 determinant, of a complex, 27
 determinantal complex, 140, 313
 determinantal ideal, 160
 determinantal ideal, skew symmetric, 187
 determinantal ideal, symmetric, 175
 determinantal variety, 160
 determinantal variety, skew symmetric, 187
 determinantal variety, symmetric, 175
 diagonal, exterior, 3
 diagonal, symmetric, 5
 diagonal, divided power, 7
 differentials in complexes $F(\mathcal{V})_\bullet$, 152–54
 differentials in resolutions of determinantal ideals, 221
 differentials in resolutions of skew symmetric determinantal ideals, 222–223
 differentials in resolutions of symmetric determinantal ideals, 222
 dimension, of a module, 12
 discriminant, 328, 356–57
 dual variety, 328
 duality for proper morphisms, 23
 dualizing complex, 21
 Durfee square, 8
- Eagon-Northcott complex, 164
 Eagon-Northcott complex, relative, 205

- embedding dimension, 15
 exact complex, based, 29
 Ext duality, 24

 Ferrers diagram, 8
 First Fundamental Theorem for $GL(E)$, 220–21
 flag variety, full, 88
 flag variety, partial, 90
 flag variety, relative, 103
 format, boundary, 337, 344
 format, exterior, 337
 format, interior, 337
 format, subboundary, 343, 346
 Frobenius functor, 80
 Frobenius notation, for partitions, 8

G-equivariant complex, 150
 Generic Perfection Theorem, 19
 Gorenstein ideal, 14
 Gorenstein ring, 17
 Goto-Józefiak-Tachibana complex, 184
 grade, of an ideal, 14
 grade, of a module, 13
 graded Betti numbers, 18
 graded character of equivariant module, 196, 210, 214
 Grassmannian, 85
 Grassmannian permutation, 200
 Grassmannian, isotropic, 104–05, 133–34, 221
 Grassmannian, relative, 103
 Grauert-Riemenschneider Theorem, 24
 Gulliksen-Negard complex, 166

 Hashimoto theorem, 174
 Hinich-Panyushev theorem, 280
 hook length, 8
 hook, of a box, 8
 hook notation, for partitions, 8
 horizontal strip, 62
 hyperdeterminant, 332

 ideal, Gorenstein, 14
 ideal, perfect, 14
 isotropic subspace, 125, 128

 Jacobson-Morozov lemma, 278
 Józefiak-Pragacz complex, 193

 Kempf's vanishing theorem, 116
 Knop-Menzel classification, 337, 356
 Koszul complex, 13, 100
 Kraft-Procesi theorem, 288, 301

 Lascoux theorem, 163
 lattice permutation, 61
 leg length, 8

 leg, of a box, 8
 linear resolutions, 223–224
 linearly reductive group, 54
 Littlewood-Richardson rule, 61–3, 106–09

 module, perfect, 14
 multiplication, exterior, 2
 multiplication, symmetric, 5
 multiplication, divided power, 7

 nilpotent orbit closures for $GL(E)$, 253
 nilpotent orbit closures, for other simple groups, 278

 open covering of a flag variety, 91, 96, 98
 order, on tableaux, 11
 orthogonal complement bundle, 126, 128, 131

 p -adic decomposition of a partition, 79
 p -adic representation of a number, 80
 partition, 8
 partition, conjugate (dual), 9
 partition, p -regular, 79
 partition, p -singular, 79
 permanent, 4
 Pieri formulas, 62
 plethysm, inner, 63
 plethysm, outer, 60
 Plücker embedding, 85–6, 88, 90
 power, exterior, 1, 66
 power, symmetric, 3, 67
 power, divided, 6
 powers of determinantal ideals, 226
 powers of skew symmetric determinantal ideals, 226–27
 principle of cancellation, 334

 rank, of a tensor, 228
 rank varieties, 228
 rank varieties, skew symmetric tensors, 239
 rank varieties, symmetric tensors, 234
 rational \mathbf{G} -action on a module, 150
 rational singularities, 25
 regular local ring, 15
 regular ring, 17
 regular sequence, 12
 regular sequence, maximal, 12
 representation, irreducible of $GL(E)$, 54
 representation, irreducible of $SO(F)$, 219
 representation, irreducible of $Sp(F)$, 218
 representation, polynomial, 50
 representation, rational, 50
 resultant, 315, 318, 322
 resultant variety, 314, 318
 ring, Cohen-Macaulay, 14, 17
 ring, Gorenstein, 15, 17

- ring of semiinvariants, 155
 Robinson-Schensted correspondence, 109
- Sato-Kimura, lemma, 156
 Schensted process, 106
 Schensted process, reverse, 107
 Schur Commutation Lemma, 57
 Schur complex, 74, 76
 Schur function, 55
 Schur functor, 49, 55
 Schur map, 37
 Schur module, 39
 Schur-Weyl duality, 106
 Serre's theorem, 118
 set, \mathbf{Z}_2 -graded, 10
 shifted graded module, 18
 skew partition, 9
 skew Schur module, 41, 69
 skew Weyl module, 44
 skew Young frame, 9
 Specht module, 81
 Steinberg theorem, 80
 straightening law, 96
 subregular orbit, 309–11
 Sylvester's expression for resultant, 317
 syzygy module, 18
- tableau, anticanonical, 52
 tableau, canonical, 51
 tableau, column standard, 10
 tableau, double standard, 93
 tableau, of shape λ/μ , 10
 tableau, row standard, 10
 tableau, standard, 10
 tangent bundle, on a Grassmannian, 102
 tautological factorbundle, 100, 103
 tautological sequence, 100, 103
 tautological subbundle, 100, 103
- U**-invariant, 51
U – p -invariant, 80
- vector bundle, 98
 vector bundle, orthogonal, 128, 130
 vector bundle, structure map of, 98
 vector bundle, symplectic, 125
 vector bundle, total space of, 98
 vertical strip, 62
- weight, 50, 112
 weight, dominant integral, 54
 weight, integral, 55
 weight space, 50
 Weyl chamber, 200
 Weyl functor, 49
 Weyl map, 43
 Weyl module, 46
- Young frame, 8
 Young scheme, 33, 42
 Young symmetrizer, 55–6