

# Index of Names

- Ahrens, R. W., 302, 317  
 Alltop, W. O., 252, 295, 317  
 André, J., 230, 317  
 Andriamanalimanana, B. R., 19,  
 300, 302, 303, 317  
 Artin, E., 90, 94, 103, 104, 218,  
 317  
 Assmus, E. F., Jr., 32, 54, 57, 79,  
 80, 84, 85, 86, 119, 126,  
 135, 219, 225, 232, 235,  
 240, 249, 263, 282, 283,  
 296, 301, 302, 303, 305,  
 312, 313, 317, 318
- Baer, R., 90, 103, 123, 218, 219,  
 318  
 Bagchi, B., 109, 136, 137, 192,  
 195, 219, 224, 299, 319  
 Bagchi, S., 109, 136, 299, 319  
 Baker, R. D., 219, 299, 319  
 Barlotti, A., 112, 214, 311, 319  
 Batten, L. M., 1, 319  
 Bénéteau, L., 298, 319  
 Berger, T., 140, 157, 319  
 Berlekamp, E. R., 39, 63, 319  
 Berman, S. D., 140, 319  
 Beth, Th., 1, 4, 214, 296, 297,  
 311, 319  
 Bhat, V. N., 266, 267, 319  
 Biggs, N. L., 214, 319  
 Birkoff, G., 62, 330  
 Blahut, R. E., 62, 69, 319  
 Blake, I. F., 62, 87, 139, 159, 167,  
 320, 333  
 Block, R. E., 20, 123, 320  
 Blokhuis, A., 219, 225, 226, 320  
 Bose, R. C., 72, 230, 258, 290, 320  
 Brauer, R., 20, 122, 320  
 Bridges, W. G., 21, 123, 320  
 Brouwer, A. E., 109, 219, 226,  
 293, 299, 301, 308, 316,  
 320  
 Bruck, R. H., 117, 202, 230, 305,  
 320  
 Bruen, A. A., 49, 53, 210, 219,  
 222, 320  
 Buekenhout, F., 12, 109, 291, 299,  
 321  
 Burau, W., 126, 321
- Calderbank, R., 87, 321  
 Cameron, P. J., 1, 104, 321  
 Camion, P., 125, 321  
 Cannon, J., 321  
 Charpin, P., 140, 157, 319, 321,  
 322  
 Cherowitzo, W. E., 219, 322  
 Cohen, A. M., 316, 320  
 Conway, J. H., 284, 287, 316, 322  
 Curtis, R. T., 316, 322  
 Czerwinski, T., 232, 322
- Dehon, M., 298, 322  
 Delandtsheer, A., 291, 321  
 Delsarte, P., 57, 86, 87, 139, 152,  
 158, 167, 180, 187, 189,

- 191, 194, 231, 311, 321,  
322, 324
- Dembowski, P., 1, 12, 13, 15, 21,  
90, 111, 112, 118, 121,  
214, 311, 323
- Dempwolff, U., 235, 246, 305, 323
- Denniston, R. H. F., 296, 323
- Dickson, L. E., 309, 323
- Dieudonné, J., 104, 323
- Dillon, J. F., 136, 269, 275, 282,  
323
- Dougherty, S. T., 211, 323
- Doyen, J., 4, 291, 293, 297, 321,  
323
- Ebert, G. L., 203, 219, 299, 319,  
323
- Elias, P., 60
- Fisher, J. C., 224, 303, 324
- Fisher, R. A., 18
- Ganley, M. J., 299, 324
- Geck, M., 300
- van der Geer, G., 32, 329
- Ghinelli Smit, D., 45, 324
- Gleason, A. M., 84, 260
- Gluck, D., 214, 324
- Goethals, J. M., 86, 139, 180, 189,  
194, 288, 289, 293, 322,  
324
- Golay, M. J. E., 31, 55, 58, 60,  
324
- Graham, R. L., 180, 194, 324
- Grey, K., 266, 324
- Gross, B. H., 9, 324
- Gruenberg, K. W., 90, 99, 324
- Hadamard, J., 250, 324
- Hahn, A. J., 90, 94, 104, 152, 324
- Hall, M., Jr., 1, 113, 121, 135,  
214, 220, 256, 260, 263,  
271, 292, 293, 297, 324,  
325
- Hamada, N., 134, 194, 203, 236,  
265, 283, 298, 325
- Hamming, R. W., 31, 55, 325
- Hanani, H., 297, 311, 325
- Hartmann, C. R. P., 73
- Hering, Ch., 205, 326
- Hill, R., 26, 27, 57, 76, 326
- Hillebrandt, G., 45, 49, 50, 52, 53,  
304, 326
- Hirschfeld, J. W. P., 20, 90, 104,  
112, 113, 191, 195, 219,  
222, 224, 225, 292, 303,  
320, 324, 326
- Hiss, G., 300, 326
- Hocquenghem, A., 72, 326
- Hölz, G., 301, 302, 326
- Hubaut, X., 297, 323
- Huffman, D.A., 60, 326
- Hughes, D. R., 1, 12, 15, 115, 118,  
120, 121, 215, 263, 295,  
312, 326
- Huppert, B., 90, 326
- Hussain, Q. M., 126, 326
- Ito, N., 257, 284, 285, 287, 326
- Jungnickel, D., 1, 282, 319, 326
- Järnefelt, G., 113
- Kantor, W. M., 282, 299, 305, 327
- Kaplansky, I., 90, 104, 327
- Kasami, T., 139, 152, 327
- Kestenband, B. C., 219, 222, 327
- Key, J. D., 190, 194, 219, 225,  
232, 235, 249, 292, 297,  
301, 302, 303, 311, 312,  
317, 318, 327
- Kibler, R. E., 125, 327
- Kimura, H., 257, 284, 285, 287,  
327, 328

*Index of Names*

341

- Kirkman, T. P., 57, 296, 328  
 Kleidman, P. B., 321  
 Kleinfeld, E., 235, 328  
 Klemm, M., 47, 49, 300, 328  
 Koch, H., 86, 87, 287, 328  
 Kolesova, G., 203, 328  
 Korchmáros, G., 113, 328  
 Kustaanheimo, P., 113  
  
 Lam, C. W. H., 203, 204, 232,  
     287, 305, 328, 329  
 Lander, E. S., 120, 121, 134, 135,  
     274, 329  
 Landrock, P., 140, 329  
 Leavitt, D. M., 17, 295, 330  
 Lenz, H., 1, 214, 319  
 Leon, J. S., 257, 286, 287, 326,  
     329  
 Lidl, R., 1, 63, 71, 169, 329  
 Liebeck, M. W., 321  
 Lin, S., 139, 327  
 van Lint, J. H., 1, 32, 60, 73, 140,  
     159, 313, 315, 318, 321,  
     329  
 Longyear, J. Q., 257, 326  
 Lorimer, P., 235, 329  
 Lüneburg, H., 16, 103, 228, 229,  
     299, 305, 312, 329, 330  
 Lunelli, L., 220, 292, 330  
  
 McEliece, R. J., 38, 40, 330  
 McKay, J., 329  
 Mackenzie, K., 135, 194, 292, 305,  
     327  
 MacLaglan-Wedderburn, J. H.,  
     229, 335  
 MacLane, S., 62, 330  
 MacWilliams, F. J., 26, 39, 60,  
     73, 76, 78, 83, 86, 139,  
     140, 180, 189, 194, 275,  
     287, 315, 322, 324, 330  
 Magliveras, S. S., 17, 295, 330  
  
 Maiorana, J. A., 39, 330  
 Mann, H. B., 135, 180, 194, 280,  
     281, 187, 202, 287, 288,  
     330  
 Manz, O., 140, 329  
 Maschietti, A., 291, 292, 330  
 Massey, J. L., 69, 330  
 Mathon, R., 109, 299, 330  
 Mattson, H. F., Jr., 32, 57, 69, 78,  
     79, 80, 85, 86, 152, 167,  
     263, 296, 312, 318, 331  
 Mendelsohn, N. S., 211, 331  
 Menon, P. K., 125, 331  
 Metz, R., 109, 220, 299, 331  
 Moore, E.H., 21, 296, 331  
 Moorhouse, G. E., 196, 331  
 Mortimer, B., 193, 300, 331  
 Mullin, R. C., 62, 139, 159, 167,  
     320  
  
 Neumaier, A., 316, 320  
 Newhart, D. W., 79, 331  
 Niederreiter, H., 1, 63, 71, 169,  
     329  
 Norman, C. W., 256, 257, 258,  
     260, 287, 331  
  
 Oakden, D.J., 232, 322  
 Ohmori, H., 236, 265, 283, 287,  
     325, 328  
 O'Meara, O. T., 90, 94, 104, 152,  
     324  
 O'Nan, M. E., 300, 331  
 Ostrom, T. G., 214, 228, 239, 240,  
     241, 242, 331  
 Ott, U., 45, 49, 53, 135, 136, 221,  
     320, 331, 332  
  
 Paige, L. J., 263, 312, 332  
 Paley, R. E. A. C., 271, 272, 332  
 Panella, G., 112, 311, 332  
 Passman, D. S., 1, 332

- Pautasso, A., 287, 328  
 Payne, S.E., 6, 332  
 Penttila, T., 113, 332  
 Peterson, W. W., 26, 60, 139, 327, 332  
 Pinneri, I., 113, 332  
 Piper, F. C., 1, 12, 15, 115, 118, 120, 121, 215, 263, 299, 312, 326, 332  
 Pless, V., 60, 73, 274, 284, 285, 286, 287, 296, 322, 329, 332  
 Pott, A., 135, 136, 332  
 Prange, E., 30, 60, 63, 82, 179, 203, 332, 333  
 Prince, A, 305, 318  
  
 Qvist, B., 110, 112, 113, 333  
  
 Ray-Chaudhuri, D. K., 9, 18, 72, 320, 333  
 Ree, R., 299, 333  
 Reifart, A., 235, 246, 305, 323  
 Roos, J. E., 73  
 Rose, K. J., 333  
 Rothaus, O. S., 275, 333  
 Rudolph, L., 139, 179, 203, 333  
 Ryser, H. J., 124, 135, 325, 333  
  
 Sachar, H. E., 84, 203, 236, 318, 333  
 Safavi-Naini, R., 87, 333  
 Salwach, C. J., 126, 135, 240, 283, 318  
 Sane, S. S., 120, 334  
 Sastry, N. S. N., 136, 137, 192, 195, 219, 224, 319  
 Saxl, J., 321  
 Scarpis, U., 271, 333  
 See, M., 220, 292, 330  
 Schatz, J. R., 282, 323  
 Schaub, T., 62, 69, 73, 333  
  
 Schmidt, W. M., 303, 333  
 Schoof, R., 82, 334  
 Schützenberger, M. P., 121, 334  
 Segre, B., 105, 110, 112, 113, 115, 334  
 Seidel, J. J., 86, 288, 289, 293, 322, 324  
 Shannon, C., 25, 334  
 Shaughnessy, E. P., 86, 334  
 Shrikhande, M. S., 120, 334  
 Shrikhande, S. S., 258, 266, 267, 288, 290, 319, 320, 334  
 Shult, E. E., 297, 327  
 Siemons, I. J., 20, 21, 122, 123, 334  
 Singer, J., 94, 334  
 Singh, N. K., 288, 334  
 Slepian, D., 39, 60, 334  
 Sloane, N. J. A., 26, 39, 60, 73, 76, 78, 86, 87, 140, 275, 284, 285, 286, 287, 315, 316, 321, 322, 329, 330, 332  
 Smith, K. J. C., 180, 194, 334  
 Solomon, G., 69, 152, 167, 331  
 Steiner, J., 57, 295, 334  
 Swiercz, S., 203, 204, 328, 329  
 Sylvester, J. J., 250, 251, 334  
 Szekeres, G., 302, 317  
  
 Teirlinck, L., 17, 295, 298, 334  
 Thas, J. A., 6, 224, 311, 324, 332, 335  
 Thiel, L., 203, 204, 287, 328, 329  
 Thompson, J. G., 287, 305, 330, 335  
 Tietäväinen, A., 60, 335  
 Tits, J., 299, 335  
 Todd, J. A., 90, 257, 266, 335  
 Tonchev, V. D., 1, 134, 236, 282, 287, 327, 335

*Index of Names*

343

Turyn, R. J., 126, 132, 260, 318,  
335

Tzeng, K. K., 73

Vandensavel, M., 297, 323

Vasil'ev, Ju. L., 60, 335

Veblen, O., 90, 229, 335

Venkov, B. B., 86

van der Vlugt, M., 82, 334

de Vries, H. L., 297, 336

Wagner, A., 121, 123, 214, 297,  
311, 323, 327, 331, 336

Ward, H. N., 76, 299, 336

Weir, A. J., 90, 99, 324

Welch, L. R., 39, 319

Weldon, E. J., Jr., 139, 152, 336

Wertheimer, M. A., 290, 305, 336

Weyl, H., 104, 336

White, A. T., 214, 319

Wielandt, H., 1, 336

Wilbrink, H., 219, 226, 300, 320,  
336

Wilf, H. S., 195, 336

Williamson, J., 278

Wilson, R. M., 8, 9, 18, 73, 333,  
336

Witt, E., 17, 311, 336

Wolk, B., 211, 331

Young, H. P., 298, 336

Young, J. W., 90, 335

Zeilberger, D., 195

# Index of Terms

- absolute,
  - point or block, 11
  - points and hyperplanes, 95
  - line, 109
- adjacent, 3
- affine part, 201
- algebraic geometry, 32
- alphabet, 27
- annihilator map, 95
- anti-flag, 2
- arc, 19
  - complete, 20
  - maximal size, 76
  - $n$ -, 75
- Assmus-Mattson theorem, 81, 85, 87
- automorphism, 11
  - anti-, 11
  - group, 11
  
- Baer
  - involution, 216
  - segment, 240-242
  - subplane, 202, 208-211, 215, 220-223, 229, 239-243, 245-246
  - subset, 202, 215
- bent function, 275-278, 277, 282, 284, 292
- biplane, 5, 6, 9-11, 15, 19, 39, 55, 120, 126, 283
- Blahut's theorem, 69, 70
- block, 1
- block design, 2
- block intersection numbers, 9
- block-tactical, 21
- blocking set, 210, 245-246
- Block's theorem, 20-23, 122, 202
- Boolean function, 141
- bound,
  - BCH, 73
  - Singleton, 29, 30, 33, 37, 74, 75
  - sphere packing, 30, 33, 73, 81, 259
  - square-root, 78, 80-81, 87
- boundary map, 45
- Brauer's theorem, 125, 128, 215
- Bruck-Ryser-Chowla theorem, 121, 249
- Bruck's theorem, 202
- Burnside's lemma, 123
  
- CAYLEY language, 235, 285, 292, 301, 305
- central collineation, 214-218, 216
  - axis of, 216
  - centre of, 216
- channel, 25-26
  - noisy communications, 26
  - symmetric, 28
- characteristic function, 13
- characteristic number, 267
- check symbols, 37
- circle, 310
- circuit, 50

*Index of Terms*

345

- circulant, 69
- classification theorem for finite
  - simple groups, 295, 297, 299
- closed configuration, 215
- code, 27
  - automorphism of, 34
  - automorphism group of, 34
  - BCH, 71-74, 72, 164, 174
    - designed distance, 73
    - narrow-sense, 72
    - primitive, 72
  - binary, 27
  - block, 27
  - block length of, 27
  - covering radius, 30
  - cyclic, 60-66, 274
    - generator matrix, 63
    - generator polynomial, 62
    - idempotent generator, 66
  - doubly-even, 86
  - dual, 36
  - equivalence, 29, 34
  - extended, 39
  - extremal, 86, 267, 271, 286-287
  - generalized Reed-Muller,
    - 152-197, 154, 212, 228-230
  - automorphism group of,
    - 156-157
  - cyclic, 159-160, 162
  - dimension of, 154, 160, 163, 173, 179
  - minimum weight of, 164-166, 177, 179
  - nonprimitive, 173
  - orthogonal, 156, 163, 176
  - punctured, 159
  - shortened, 159
  - subfield subcode, 177
- Golay, 31, 60, 296, 312-316,
  - binary, 30, 80, 263
  - ternary, 41, 80, 260, 262-263, 284
- GRM, *see* code, generalized Reed-Muller
- Hamming, 55-60, 92, 305
  - $q$ -ary, 58
    - binary, 31, 37, 38, 40, 42, 56, 64-65, 72-73, 79, 82, 143, 145, 151, 203-204, 209, 238, 267, 284-285, 297-298
- length, 29
- linear, 26, 31
  - equivalence of, 33
  - isomorphism of, 33
- MDS, 74-76, 80, 82, 155
  - Reed-Solomon MDS, 166
  - weight distribution, 76
- $(n, M, d)$   $q$ -ary, 29
- of an incidence structure, 41
- optimal, 74
- orthogonal, 36
- packing radius, 30
- perfect, 31, 55-56, 58-60, 81, 314
  - linear, 31
  - trivial, 31
- polynomial, 139, 152
- punctured, 40
- $q$ -ary, 27
- quadratic-residue, 76-81, 87, 274, 286, 314
  - augmented, 77
  - expurgated, 77
  - extended, 79, 270
- Reed-Muller, 58, 66, 139-152, 143, 209, 265, 269-271, 275-278, 280-282, 284, 292, 297
  - dimension of, 143
  - minimum weight of, 149

- minimum weight vectors, 149
  - orthogonal, 144
  - punctured, 145
- Reed-Solomon, 73-74, 166
  - extended, 74
- repetition, 27, 31, 56
- self-dual, 36
- self-orthogonal, 36
- simplex, 57
- subfield subcode, 177
- codeword, 25, 27
  - minimum-weight, 32
- collineation, 11
- column space, 42
- complementary basis, 169
- complementary structure, 14
  - parameters of, 14
- conic, 105, 110-112, 224-225, 245, 291
- connected structure, 50
- constant vector, 208
- contained, 229
- contraction, 15
- convolution product, 70
- coordinate functional, 32
- correlation, 11
- coset, 189
- coset leader, 39
- cross ratio, 101-103, 102
- cyclotomic cosets, 66
  
- decoder, 25
- decoding,
  - nearest-neighbour, 28
  - standard-array, 39
- Delsarte's theorem, 186
- Dembowski-Wagner theorem, 122
- derivation, 238-247
- derivation set, 241
- derived structure, 15
- desarguesian, 109
  
- Desargues' theorem, 103-104, 218
- design, 2
  - affine geometry, 57, 265, 283, 292, 297-298, 311
  - code of, 151, 180, 192, 195
  - balanced incomplete block, 3
  - difference-set, 123-128, 135-136, 274-275, 278, 280-284, 292
  - divisibility criterion, 16
  - from geometries, 99-101
  - Hadamard, 15, 119, 251, 249-293, 314
    - bound for  $p$ -rank, 265
    - code of, 258-263, 265
    - equivalent, 256
    - $p$ -equivalent, 260
  - hull of, 43
  - isomorphism of, 11
  - order of, 9
  - oval, 21, 290-292, 300-301, 304-309
    - resolution in, 291
  - pairwise-balanced, 3
  - Paley, 274
  - parameters, 2, 6
  - $p$ -rank, 42
  - projective, 57, 118
  - projective geometry, 122, 134, 269, 297-298
    - code of, 151, 180, 193
  - quasi-symmetric, 120
  - simple, 3
  - spherical, 86, 311
  - Steiner, 4, 8-10, 49, 51, 53, 120, 294-300, 295-316
  - symmetric, 4, 13-14, 43, 49, 58, 76, 91, 100-101, 117-137, 118, 175, 190, 199, 249, 252-254, 270, 279-282, 289, 291, 314
  - dual of, 14



*Index of Terms*

347

- parameters, 118
- residual of, 120
- translate, 126
- trivial, 3
- $t$ -design, 2, 6
- unitary, *see* unital
- Witt/Mathieu, 16, 17, 43, 96, 312-316
- difference-set, *see* design, 11, 124, 123-128, 280, 282
  - abelian, 124
  - cyclic, 124
  - development of, 125
  - Hadamard, 280, 283
  - multiplier of, 127
  - planar, 126
  - translates of, 125
- dimension formula, 91
- distance, 28
  - designed, 73
  - Hamming, 28
  - minimum, 28
- domain,
  - principal ideal, 62
  - unique factorization, 63
- dual
  - basis, 95
  - space, 32, 94
  - structure, 13
- edge-graph, 316
- edge, 3
- elation, 216
- encoder, 25
- encoding, 25
  - using standard form, 36
- error,
  - correction of, 29
  - detection of, 29
- euclidean space, 310
- extension. 15
  - of a  $2-(2k-1, k-1, \lambda)$  design, 251
  - of a Hadamard 2-design, 252
  - of affine planes, 309
  - of the projective plane of order 4, 313
- exterior
  - block, 19
  - line, 110
- external structure, 15
- Fisher's inequality, 10, 18, 42
- flag, 2
- flag space, 44
- flat,
  - $r$ -, 96
- form, 104-115, 105
  - alternate, 106
  - bilinear, 95
  - hermitian, 95, 107
  - non-singular, 106
  - orthogonal, 106
  - quadratic, 107, 111
  - skew-symmetric, 106
  - symmetric, 106
  - symplectic, 106
- fundamental embedding theorem, 98
- Galois correspondence, 107, 230, 235
- generalized quadrangle, 5, 7, 13, 120, 192
  - classical, 109
  - type of, 6
- geometrical terminology, 191
- geometry, 89-115
  - affine, 89, 96-99
    - fundamental theorem, 98
  - finite, 89
  - projective, 89, 90-96, 121, 310

- anti-automorphism, 95
- anti-isomorphism, 95
- automorphism, 92
- collineation, 92
- correlation, 95
- fundamental theorem, 94
- isomorphism, 92
- polarity, 95
- synthetic treatment, 90
- geometry of rank  $n$ , 45
- Gleason-Prange theorem, 80-81
- graph, 3
  - bipartite, 3
  - complete, 3, 5-6, 11, 16
  - line, 120
  - null, 3
  - regular, 3
  - regular bipartite, 117
  - strongly regular, 3-4, 7, 11, 120
    - parameter set of, 3
  - valency of, 3
- group,
  - affine, 80
  - affine general linear, 98
  - affine semilinear, 98
  - affine special linear, 98
  - dihedral, 306
  - elementary abelian 2-, 280-281, 283-284
  - Galois, 77
  - linear fractional, 80
  - Mathieu, 260, 262, 284, 296
  - orthogonal, 115
  - permutation, 6
  - projective general linear, 94
  - projective semilinear, 94
  - quaternion, 124
  - Ree, 299
  - regular, 34
  - Singer, 221
  - symmetric, 11
  - symplectic, 115, 301
  - transitive extension, 6
  - transitive permutation, 5
  - unitary, 115, 300
- group algebra, 34, 62, 129-132
  - canonical involution of, 129
- Hadamard's inequality, 250
- Hall triple system, 298
- Hall's multiplier theorem, 128, 135-136
- Hamada's conjecture, 134, 236
- Hamada-Ohmori rigidity theorem, 249, 265
- Hamada-Sachar conjecture, 236, 238
- Hasse-Minkowski results, 121
- hermitian variety, 108-109, 115, 190
- homogeneous coordinates, 96
- homology, 216
- hyperoval, 112
- hyperplane,
  - affine, 96
  - projective, 90
- icosahedron, 316
- idempotent generator, 274
- incidence map, 50-51
- incidence matrix, 12
- incidence structure, 1
  - $p$ -rank of, 42
- incident, 1
- information
  - rate, 31
  - symbols, 37
  - theory, 26
- inner product, 35
- internal structure, 15
- inversive plane, *see* plane
- involution, 299
- isometry, 108, 115

*Index of Terms*

349

- isomorphism, 10  
 anti-, 11  
 isotropic subspace, 95
- Klemm's theorem, 133  
 knot, 112  
 Kronecker  $\delta$ , 131  
 Kronecker product, 263-266
- Latin square, 262  
 Leech lattice, 315  
 Legendre symbol, 272-273  
 Lenz-Barlotti classification, 214  
 line, 4, 8, 121-122  
 affine, 96  
 at infinity, 200  
 projective, 90  
 linear complexity, 69, 73  
 linear equivalence, 43  
 linear functional, 32, 141  
 linear over, 229  
 linear space, 4, 49, 51  
 bound for  $p$ -rank, 52-53  
 partial, 4, 49, 51  
 Lucas's Theorem, 191
- MacWilliams relations, 81, 83-84,  
 87, 262, 313
- matrix,  
 companion, 159  
 generator for extended code,  
 40  
 generator, 35  
 Hadamard, 66, 249-293, 313  
 automorphism, 256  
 code of, 260  
 constant-sum, 291  
 equivalent, 255-257  
 Kronecker product construction,  
 263  
 normalized, 257  
 order of, 250, 253  
 regular, 275, 279  
 hermitian, 108  
 incidence, 12  
 Jacobsthal, 261, 272, 273  
 Paley-Hadamard, 260, 261,  
 271-275, 286  
 parity-check, 36  
 standard form, 36  
 standard form, 35  
 Sylvester, 66, 250, 256, 264-  
 266, 265, 271, 275, 280;  
 282  
 Vandermonde, 68, 227, 251  
 Mattson-Solomon polynomial, 169  
 message symbols, 37  
 metric, 28  
 monomial function, 141  
 Moufang loop, 298  
 multiplier, 127, 136  
 theorem, 136
- nearfield, 243  
 net, 21, 196  
 nucleus, 112
- O'Nan configuration, 300  
 orthogonality relations, 78, 132,  
 155  
 oval, 19, 20, 105, 110-114, 204,  
 206, 213-214, 218-225,  
 237, 243-247, 290-292,  
 300-303, 304-309, 312  
 hyperbolic, 243  
 Lunelli-Sce-Hall, 220, 292  
 regular, 113, 291, 301  
 size of, 20  
 overall parity check, 40  
 ovoid, 111-112, 192, 195, 310-311  
 Tits, 112, 192, 311
- Paley construction, 251  
 parallel, 200

- parallel class, 21  
parallel cosets, 97  
parallel postulate, 200  
parallelism, 21  
parametric coordinates, 101  
Parseval's equation, 276-277  
Pascal's triangle, 8, 10, 119, 251, 315  
perfect difference set, 124  
plane, 199-247  
    affine, 16, 21, 96-97, 100, 109, 158, 200, 270, 296, 298, 300, 309  
    desarguesian, 158, 163, 182, 310  
    bounds for  $p$ -rank, 53, 133, 236  
    desarguesian, 53, 103, 291-292, 298, 301  
     $p$ -rank, 194-195, 213  
    Fano, 4-6, 9-10, 15-16, 19, 38-40, 42-43, 49, 53-55, 66, 204, 219, 255, 266, 298, 312  
    Hall, 242  
    inversive, 49, 309-312  
    egglike, 310  
    Lorimer, 235  
    Miquelian, 311  
    Möbius, 310  
    non-desarguesian, 103, 291  
    projective, 5, 49, 53, 55, 76, 90-91, 98-99, 100, 103, 105, 108-113, 119-120, 122, 126, 132, 135, 200, 262, 290, 296, 298, 302, 304  
    desarguesian, 14, 174-175  
    of order 3, 84  
    of order 8, 82  
    of order 9, 203  
    of order 10 (nonexistence), 203  
    of order 11, 203  
    of order  $p^2$ , 203  
synthetic definition of, 199  
tame, 235-238, 237  
translation, 200, 218, 224, 228-235, 237-240, 242-244, 246, 270, 283, 291, 305  
    bound for  $p$ -rank, 234  
    kernel, 229, 231  
    Veblen-Wedderburn, 229  
plot, 117  
point at infinity, 200  
point-tactical, 21  
points, 1  
polarity, 11, 95, 107, 109-110, 115, 224, 226  
    null, 11  
    orthogonal, 107, 110-111, 114, 220, 224  
    symplectic, 107, 109  
    unitary, 107-109, 220, 298, 303  
polynomial,  
    check, 64  
    generator, 62  
    Mattson-Solomon, 169  
    minimal, 71  
    monic, 62  
    reciprocal, 64  
 $p$ -rank of a design, 42  
    bounds for  
    2-designs, 47  
    difference-set design, 283  
    Hadamard designs, 258  
    265  
    linear spaces, 52-53  
    oval designs, 291, 304  
    Steiner 2-designs, 52-53  
    Steiner triple systems, 297  
    298

*Index of Terms*

351

- symmetric designs, 133
- translation planes, 234
- unitals, 300
- formula for
  - desarguesian planes, 213
  - designs from geometries, 94-196
  - Hadamard designs, 292
  - inversive planes, 311
  - Ree unitals, 300
  - Steiner triple and quadruple systems, 298
  - Witt design, 314
  - 3-(16,8,3) designs, 266-268
- primitive derivation, 242
- principal character, 130
- principle of duality, 199
- projective completion, 100, 201
- projective dimension, 90
- projective points, 90
- projective space, *see* geometry
- quadratic residue, 76, 271
- quadratic-reciprocity law, 79
- quadric, 107, 110-112, 115, 305, 311
  - elliptic, 112, 192, 311
  - non-degenerate, 112
- quotient set, 124
- rank of incidence matrix, 17
- rank of subspace, 90
- redundancy, 25, 31
- repeated blocks, 2
- replication number, 3
- residual structure, 15
- resolution, 21, 308-309
- resolvable structure, 21
- restriction, 15
- rigidity theorem, 230, 298
- ring,
  - commutative. 62
  - factor, 61
  - polynomial, 61
  - principal ideal, 61-62
- row space, 41
- Schreier conjecture, 295
- secant, 19, 110
- Segre's theorem, 113, 220, 225, 303
- self-complementary, 15
- self-dual structure, 14
- semilinear transformation, 93
- shift register, 60, 69
- short exact sequence, 148, 182
- size (of a Hadamard matrix), 250
- Singer cycle 94, 160, 219, 221, 223, 225
- source, 25
- special  $n$ -tuple, 267
- sphere of radius  $r$ , 30
- spread, 230
- square structure, 118
- standard module, 45
- Steinberg module, 45
  - dimension of, 45, 50, 53
- Steiner system, *see* design
- Steiner quadruple system, 57, 152, 296-298
- Steiner triple system, 10, 54, 57, 151-152, 190, 293, 296-298
- strongly regular, *see* graph, 3
- subcode, even-weight, 72
- subfield subcode, 177
- subplane, 202
- support, 32, 205
- symmetric-difference property, 282
- symmetric difference, 269, 280, 289, 312
- syndrome, 39, 55

tactical configuration, 3  
 tactical decomposition, 21  
 tame, 237  
 tangent, 19, 110  
 tangent hyperplane, 111  
 trace, 67, 169  
 transform, 66-71  
   discrete, 66  
   discrete Fourier, 62, 68, 168  
   Hadamard, 66, 275  
   inverse, 66  
 translation, 98  
 translation group, 218  
 translation line, 218  
 translation plane, 194  
 translation point, 218  
 transversal, 208-209  
 truth table, 141

unital, 49, 105, 109, 218-223, 293,  
   298-304  
   classical, *see* hermitian  
   hermitian, 109, 219-220, 222,  
   224-228, 293  
   Ree, 55, 292-293, 299

valency, 3  
 variety, 117  
 vector,  
   all-one, 36  
   error, 39  
   incidence, 41  
   minimum-weight, 32  
 vertex, 3

Wedderburn's theorem, 96  
 weight, 32  
   minimum, 32  
    $q$ -, 160  
 weight distribution, 82, 314  
   complete, 84

weight enumerator, 81-87, 82,  
 209, 301, 303, 313  
 complete, 84  
 for projective plane of order  
   three, 85  
 for projective plane of order  
   eight, 83  
 for projective planes, 82  
 for [64, 13, 24], 292  
 homogeneous form, 82