
Index

- absolute continuity, 188
 - theorem, 191
- absolutely continuous
 - foliation in the strong sense, 188
 - foliation in the weak sense, 188
 - transformation, 191
- accessibility property, 281
 - essential –, 282
- accessible points, 281
- admissible submanifold, 183
- Anosov
 - diffeomorphism, 4, 6
 - dissipative – diffeomorphism, 196
 - flow, 9
- asymptotic geodesics, 248
- asymptotically stable solution, 149
 - conditionally –, 158
- attractor, 20
- automorphism
 - Bernoulli –, 8
 - hyperbolic toral –, 4
- backward
 - Lyapunov exponent, 89
 - regular Lyapunov exponent, 67, 79
 - regular point, 121
 - regular sequence of matrices, 79
- basin of attraction, 259
- basis
 - normal –, 48
 - ordered –, 48
 - subordinate –, 48, 49
- Bernoulli automorphism, 8
- Besicovich covering lemma, 198
- block
 - Pesin –, 190, 212
 - r -foliation –, 187
 - s -foliation –, 190
 - u -foliation –, 191
- canonical metric, 238
- Cauchy matrix, 154
- center bunched diffeomorphism, 282
- central space, 280
- characteristic exponent, 45, 151
- cocycle, 81, 82, 93
 - derivative –, 82
 - induced –, 84
 - linear multiplicative –, 82, 93
 - power –, 84
 - reducible –, 93
 - tempered –, 85
 - triangular –, 105, 106
- cocycles
 - cohomologous –, 86
 - equivalent –, 86
- coefficient
 - irregularity –, 51
 - Perron –, 51
- coherent filtrations, 68, 91
- cohomological equation, 87
- cohomologous cocycles, 86
- cohomology, 85
- common refinement, 223
- complete
 - family of cones, 273

- function, 273
- hyperbolicity conditions, 130
- pair of cones, 273
- condition
 - complete hyperbolicity –, 130
 - partial hyperbolicity –, 140
- conditional
 - entropy, 223
 - measure, 208
- cone, 271
 - connected –, 277
 - negative –, 273
 - positive –, 273
 - stable –, 27
 - unstable –, 27
- connected cone, 277
- coordinate chart
 - foliation –, 217
- curve
 - global stable –, 5
 - global unstable –, 5
- density function, 259
- derivative cocycle, 82
- diffeomorphism
 - Anosov –, 4, 6
 - center bunched –, 282
 - flat –, 36
 - hyperbolic –, 291
 - structurally stable –, 9
 - uniformly partially hyperbolic –, 280
 - W -dissipative –, 289
- Diophantine condition, 94
 - recurrent –, 96
- dissipative Anosov diffeomorphism, 196
- distribution, 141
 - Hölder continuous –, 142
 - integrable –, 7
- dual
 - bases, 51
 - Lyapunov exponents, 51
 - points, 251
- dynamical system
 - hyperbolic –, 3
 - nonuniformly hyperbolic –, 132
- entropy, 224
 - conditional –, 223
 - formula, 222, 229
 - Kolmogorov–Sinai –, 222
 - lower local leaf –, 236
 - measure-theoretic –, 222
 - metric –, 222, 224
 - of geodesic flow, 253
 - of partition, 273
 - upper local leaf –, 236
- equivalent
 - cocycles, 86
 - partitions, 223
- ergodic
 - components, 208
 - measure, 8, 10
 - properties, 207
- ergodicity
 - local –, 216
 - of smooth hyperbolic measure, 207
- essential accessibility property, 282
- eventually strict
 - family of cones, 277
 - Lyapunov function, 274
- exponentially stable solution, 149
 - conditionally –, 158
- family of u -manifolds, 191
- filtration, 47
 - linear –, 47
 - set –, 305
- first return
 - map, 84
 - time, 84
- flat
 - diffeomorphism, 36
 - strip theorem, 249
- flow, 149
 - Anosov –, 9
 - entropy of geodesic –, 253
 - geodesic –, 12, 240, 248
 - special –, 9
 - suspension –, 10
 - topologically mixing –, 10
 - topologically transitive –, 10
 - weakly mixing –, 216
- foliation, 7, 217
 - absolutely continuous –, 188
 - coordinate chart, 7, 217
 - Hölder continuous –, 7
 - nonabsolutely continuous –, 205
 - smooth –, 7
 - with finite volume leaves, 289
 - with smooth leaves, 7
- forward
 - Lyapunov exponent, 88
 - regular Lyapunov exponent, 67, 78
 - regular point, 121

- regular sequence of matrices, 78
- function
 - complete –, 273
 - density –, 259
 - Lyapunov –, 274
 - roof –, 10
 - slow-down –, 23
 - tempered –, 85, 93, 114, 125
- generator, 83
- geodesic flow, 12, 240, 248
- global
 - leaf, 7, 217
 - stable curve, 5
 - stable manifold, 5, 7, 183, 185
 - unstable curve, 5
 - unstable manifold, 5, 183, 185
 - weakly stable manifold, 185
 - weakly unstable manifold, 185
- graph transform property, 181
- Hamiltonian, 26
- Hölder
 - constant, 142
 - continuous distribution, 142
 - continuous foliation, 7
 - exponent, 142
- holonomy map, 191
- homoclinic class, 20
- homoclinically related, 19
- horocycle, 13, 250
- horseshoe, 19
- hyperbolic
 - attractor, 20
 - dynamical system, 3
 - measure, 123
 - set, 14
 - toral automorphism, 4
- hyperbolicity
 - estimates, 6
 - parameters of –, 6, 14, 130
- ideal boundary, 11, 249
- implicit function theorem, 173
- inclination lemma, 181
- independent partitions, 223
- index, 19
 - rational – set, 211
 - set, 133
- induced
 - cocycle, 84
 - transformation, 84
- inner product
 - Lyapunov –, 136
 - strong Lyapunov –, 110
 - weak Lyapunov –, 136
- integrability condition, 87
- integrable distribution, 7
- invariant
 - family of cones, 273
 - splitting, 6
- irregularity coefficient, 51
- Jacobian, 191
- Katok map, 22, 25, 27
- kernel
 - Pesin tempering –, 111
 - tempering –, 114
- Kolmogorov–Sinai entropy, 222
- lamination, 184
- leaf
 - global –, 7, 217
 - local –, 7, 217
 - lower – pointwise dimension, 235
 - lower local – entropy, 236
 - upper – pointwise dimension, 235
 - upper local – entropy, 236
 - volume, 187
- level set, 133
- limit solution
 - negative –, 243
 - positive –, 243
- linear
 - extension, 82, 83
 - filtration, 47
 - skew product, 83
- local
 - ergodicity, 216
 - leaf, 7, 217
 - manifold theory, 163
 - product structure, 258
 - s -canonical – transversal, 191
 - smooth submanifold, 159, 164
 - stable manifold, 7, 148, 185
 - transversal, 190
 - u -canonical – transversal, 190
 - unstable manifold, 7, 178, 185
- locally maximal set, 19
- lower
 - leaf pointwise dimension, 235
 - local leaf entropy, 236
 - pointwise dimension, 234

- LP-regular
 - Lyapunov exponent, 69, 79
 - point, 91, 121
- Lyapunov
 - backward – exponent, 89
 - change of coordinates, 111
 - characteristic exponent, 45
 - chart, 137
 - eventually strict – function, 274
 - exponent, 45, 54
 - forward – exponent, 88
 - function, 274
 - inner product, 110, 136
 - LP-regular – exponent, 69, 79
 - Lyapunov–Perron regular – exponent, 69, 79
 - metric, 17
 - norm, 137
 - spectrum, 47, 120, 123
 - stability theorem, 153
 - stability theory, 147
 - strong – chart, 118
 - strong – inner product, 110
 - strong – norm, 111
 - value of – exponent, 46
 - weak – inner product, 136
 - weal – norm, 137
- Lyapunov–Perron regular
 - Lyapunov exponent, 69, 79
 - point, 91, 121
- manifold
 - global stable –, 5, 7
 - global unstable –, 5
 - local stable –, 7
 - local unstable –, 7, 178
 - of nonpositive curvature, 240
- map
 - absolutely continuous –, 191
 - holonomy –, 191
 - Katok –, 22, 25
 - nonuniformly hyperbolic –, 130
 - nonuniformly partially hyperbolic –, 140
 - uniformly hyperbolic –, 14
- measurable
 - lamination, 184
 - vector bundle, 83
- measure
 - conditional –, 208
 - ergodic –, 8, 10
 - hyperbolic –, 123
 - Sinai–Ruelle–Bowen –, 22
 - smooth –, xiv, 207
 - SRB –, 22
 - measure-theoretic entropy, 222
- metric
 - canonical –, 238
 - entropy, 222, 224
 - Lyapunov –, 17
- multiplicative ergodic theorem, 97, 105, 122
- negative
 - cone, 273
 - limit solution, 243
 - rank, 273, 274
- neighborhood
 - regular –, 118
- nonabsolutely continuous foliation, 205
- nonpositive curvature, 240, 242
- nonuniform
 - hyperbolicity, xv, 129
 - hyperbolicity theory, 119, 158, 163
- nonuniformly
 - hyperbolic dynamical system, 132
 - hyperbolic map, 130
 - hyperbolic set, 130, 131
 - partially hyperbolic map, 140
 - partially hyperbolic set, 140
- nonzero Lyapunov exponents, 120, 123
 - diffeomorphism with –, 33
 - flow with –, 39
- norm
 - Lyapunov –, 137
 - strong Lyapunov –, 111
- normal basis, 48
- normalization property, 45
- order of perturbation, 151
- ordered basis, 48
- Oseledets
 - decomposition, 69, 91
 - subspace, 91
- Oseledets–Pesin reduction theorem, 111
- parameters of hyperbolicity, 6, 14, 130
- partial hyperbolicity conditions, 140
- partitions
 - equivalent –, 223
 - independent –, 223
- Perron coefficient, 51
- perturbation, 151
 - order of –, 151

- Pesin
 - block, 190, 212
 - set, 133
 - tempering kernel, 111
- point
 - at infinity, 249
 - backward regular –, 121
 - forward regular –, 90, 121
 - LP-regular –, 91, 121
 - Lyapunov–Perron regular –, 91, 121
- pointwise dimension, 234
 - lower –, 234
 - lower leaf –, 235
 - stable –, 235
 - unstable –, 235
 - upper –, 234
 - upper leaf –, 235
- positive
 - cone, 273
 - limit solution, 243
 - rank, 273, 274
- power cocycle, 84
- property
 - accessibility –, 281
 - essential accessibility –, 282
- q -foliation, 217
 - with smooth leaves, 217
- r -admissible submanifold, 183
- r -foliation block, 187
- r -local transversal, 187
- rank
 - negative –, 273, 274
 - positive –, 273, 274
- rational index set, 211
- rectangle, 258
- recurrent Diophantine condition, 96
- reducible cocycle, 93
- refinement, 223
 - common –, 223
- regular
 - backward –, 67
 - backward – Lyapunov exponent, 79
 - backward – point, 90
 - forward –, 67, 78
 - forward – point, 90
 - Lyapunov–Perron – point, 91
 - neighborhood, 115, 118
 - pair of Lyapunov exponents, 53
 - set, 133
- return
 - map, 84
 - time, 84
- roof function, 10
- s -canonical local transversal, 191
- s -foliation block, 190
- s -manifold, 190
- sequence of matrices
 - backward regular –, 79
 - forward regular –, 78
- set
 - filtration, 305
 - hyperbolic –, 14
 - index –, 133
 - level –, 133
 - locally maximal –, 19
 - nonuniformly hyperbolic –, 130, 131
 - nonuniformly partially hyperbolic –, 140
 - Pesin –, 133
 - regular –, 133
 - uniformly completely hyperbolic –, 14
- Sinai–Ruelle–Bowen measure, 22, 259
- slow-down, 44
 - function, 23
 - procedure, 23
- Smale–Williams solenoid, 20
 - slow-down of –, 43
- smooth
 - ergodic theory, xiv, 207, 208, 222
 - foliation, 7
 - measure, xiv, 207
- solenoid, 20
 - slow-down of –, 43
- solution
 - asymptotically stable –, 149, 158
 - conditionally stable –, 158
 - exponentially stable –, 149, 158
 - stable –, 149
 - unstable –, 149
- space
 - central –, 280
 - stable –, 280
 - unstable –, 280
- special flow, 9
- spectral decomposition theorem, 215
- spectrum
 - Lyapunov –, 47, 123
- SRB measure, 22, 259
- stability theory, 147
- stable
 - conditionally – solution, 158

- cone, 27
 - global – curve, 5
 - global – manifold, 5, 7, 183, 185
 - global weakly – manifold, 185
 - local – manifold, 7, 148, 185
 - manifold theorem, 164
 - manifold theorem for flows, 185
 - pointwise dimension, 235
 - solution, 149
 - subspace, 5, 6, 14, 124, 130, 148, 280
- strict family of cones, 277
- strong
 - Lyapunov chart, 118
 - Lyapunov inner product, 110
 - Lyapunov norm, 111
- structurally stable diffeomorphism, 9
- submanifold
 - local smooth –, 159, 164
 - r -admissible –, 183
- subordinate basis, 48, 49
- subspace
 - Oseledets –, 91
 - stable –, 5, 6, 14, 124, 130, 148
 - unstable –, 5, 6, 14, 124, 130
- suspension flow, 10
- symplectic group, 277
- system of variational equations, 28, 150
- tempered
 - cocycle, 85
 - equivalence, 85
 - function, 85, 93, 114, 125
- tempering kernel, 111, 114
 - lemma, 114
- theorem
 - absolute continuity –, 191
 - flat strip –, 249
 - implicit function –, 173
 - Lyapunov stability –, 153
 - multiplicative ergodic –, 97, 105, 122
 - reduction –, 110, 111
 - spectral decomposition –, 215
 - stable manifold –, 164
 - stable manifold – for flows, 185
- theory
 - local manifold –, 163
 - Lyapunov stability –, 147
 - nonuniform hyperbolicity –, 119, 158, 163
 - stability –, 147
- topologically
 - mixing flow, 10
 - transitive flow, 10
 - transitive map, 220
- total measure, 311
- transitive
 - topologically – map, 220
- transversal, 187
 - local –, 190
 - s -canonical local –, 191
 - u -canonical local –, 190
- transverse subspaces, 143
- trapping region, 20
- triangular cocycle, 105, 106
- u -canonical local transversal, 190
- u -foliation block, 191
- uniformly
 - completely hyperbolic set, 14
 - hyperbolic map, 14
 - partially hyperbolic diffeomorphism, 280
- unstable
 - cone, 27
 - global – curve, 5
 - global – manifold, 5, 183, 185
 - global weakly – manifold, 185
 - local – manifold, 7, 178, 185
 - pointwise dimension, 235
 - solution, 149
 - subspace, 5, 6, 14, 124, 130, 280
- upper
 - leaf pointwise dimension, 235
 - local leaf entropy, 236
 - pointwise dimension, 234
- variational equations, 28, 148, 150
- vector bundle, 83
- W -dissipative diffeomorphism, 289
- weak
 - Lyapunov chart, 137
 - Lyapunov inner product, 136
 - Lyapunov norm, 137
- weak*-topology, 22
- weakly
 - mixing flow, 216
 - stable foliation, 9
 - unstable foliation, 9