

Index

- action of a Lie groupoid
 - on a Lie groupoid, 126
 - on a manifold, 125
- anchor of a Lie algebroid, 151, 153
- arrows of a groupoid, 111
- Atiyah sequence, 156
- atlas, 1
 - foliation—, 5
 - orbifold —, 38
- $\text{Aut}(M, \mathcal{F})$, 82
- automorphism of a foliated manifold, 82

- $\mathfrak{b}(M, \mathcal{F})$, 161
- base manifold
 - of a Lie algebroid, 153
 - of a Lie groupoid, 112
- basic function, 83
- $\text{Bis}(G)$, 115
- bisection
 - global, 114
 - local, 114
- bundle
 - complex frame — of an orbifold, 44
 - flat, 17
 - foliated principal G -, 98
 - frame —, 93
 - of a manifold, 42
 - of an orbifold, 43
 - normal, of a foliation, 12
 - orientable, 3
 - orthogonal frame —, 43
 - of an orbifold, 43
 - positive frame — of an orbifold, 43
 - positive orthogonal frame — of an orbifold, 43
 - principal G -, 93, 145
 - trivial, 93
 - tangent —
 - of a foliation, 10
 - of a manifold, 1
 - transverse frame —, 99
 - transverse orthogonal frame —, 100
 - transverse principal G -, 98
 - trivial principal G -, 145
 - unit principal G -, 145
 - unitary frame — of an orbifold, 44
- bundle map, 93

- canonical form, 94
 - on $OF(M)$, 94
 - transverse, 100
- canonical local form, 2
 - of a submersion, 2
 - of an immersion, 2
- canonical parallelism, 98
- change-of-charts homeomorphism, 1
- chart, 1
 - foliation —, 5
 - orbifold —, 37
- codimension of a foliation, 5
- compatible orbifold charts, 38
- connection, 94
 - \mathcal{F} -partial, 148
 - flat, 95
 - flat \mathcal{F} -partial, 148
 - Levi-Civita, 97
 - projectable, 99
 - torsion free, 97
 - transverse Levi-Civita, 101
- critical point, 58
- critical value, 58
- curvature form, 95

- Darboux cover, 104
- derivative, 2
- $\text{Diff}(M)$, 35
- $\text{Diff}_x(M)$, 21
- $\text{Diff}_x^+(M)$, 21
- diffeomorphism, 2
 - local, 2, 134

- differential form, 2
 - integrable, 12
 - Maurer–Cartan, 102
- differential ideal, 9
- Eff, 136
- effect of an étale groupoid, 137
- embedding, 3
 - between orbifold charts, 37
- equivalence
 - Morita, of Lie groupoids, 130
 - of categories, 127
 - of pseudogroups, 139
 - strong, of Lie groupoids, 128
 - weak, of Lie groupoids, 128, 130
- equivariant map of principal bundles, 145
- essentially surjective functor, 127
- étale map, 2, 134
- exterior differentiation, 2
- exterior product, 2
- \mathcal{F}_{bas} , 84
- fibred product of Lie groupoids
 - strong, 123
 - weak, 124
- flow, 16
- foliated action of a Lie group, 16
- foliation, 5
 - associated to a Lie group action, 16
 - associated to a submersion, 6
 - basic, 84
 - developable, 161
 - homogeneous, 82
 - invariant, 15
 - Kronecker, 6
 - Lie, 102
 - lifted, 99
 - of the Möbius band, 6
 - orientable, 12
 - quotient —, 15
 - Reeb, 7
 - of S^3 , 8
 - Riemannian, 26
 - simple, 6
 - strictly simple, 6
 - transversely orientable, 12
 - transversely parallelizable, 88
 - trivial, 6
- full and faithful functor, 127
- G_x , 112
- $G(x, y)$, 112
- $\Gamma(M)$, 134
- Γ^q , 134
- gauge group, 114
- germ, 20
 - one-sided, 57
- Godbillon–Vey class, 13
- groupoid, 111
 - action —, 113
 - effective, 137
 - étale, 134
 - étale holonomy —, 135
 - étale monodromy —, 135
 - fundamental, 113
 - gauge —, 114
 - Haefliger, 134
 - Hausdorff Lie, 112
 - holonomy —, 118
 - induced, 121
 - kernel —, 113
 - Lie, 112
 - weakly equivalent to a discrete group, 133
 - monodromy —, 117
 - of an orbifold, 142
 - over G_0 , 112
 - pair —, 113
 - proper effective, 141
 - source-connected Lie, 157
 - source-simply-connected Lie, 157
 - transitive Lie, 129, 132
 - translation —, 113, 125
 - unit —, 113
- Haefliger cocycle, 9
- Haefliger’s theorem, 57
- Hessian matrix, 58
- $\text{hol}(\alpha)$, 21
- $\text{Hol}(L, x)$, 23
- $\text{Hol}(M, \mathcal{F})$, 118
- holonomy, 21
 - one-sided, 57
- holonomy class, 23
- holonomy cover, 31
- holonomy group, 23
 - linear, 23
 - of a flat connection, 96
 - of a Lie foliation, 103
- holonomy groupoid, 118
 - étale, 135
- holonomy homomorphism, 23
 - linear, 23
 - of a Lie foliation, 104
- holonomy pseudogroup, 139
- homomorphism
 - of groupoids, 112
 - of Lie groupoids, 112
- horizontal vectors, 95
- immersion, 2
- infinitesimal action, 155

172

integrable subbundle, 9
 integral of a Lie algebroid, 154
 inverse map, 111
 $\text{Iso}_z(Q)$, 40
 isomorphism of Lie groupoids, 127
 isotropy
 in a groupoid, 112
 of a leaf, 16
 of a point, 16
 of a point of an orbifold, 40
 of a subset, 35
 isotropy groups, discrete, 136

 (K, ϵ) -cocycle, 50
 normalized, 50

 $L(M, \mathcal{F})$, 86
 $l(M, \mathcal{F})$, 86
 leaf, 5
 Leibniz identity, 153
 Lie algebroid, 153
 basic, of a transversely parallelizable
 foliation, 161
 integrable, 154
 of a Lie groupoid, 152
 regular, 156
 transformation —, 155
 transitive, 156
 Lie subalgebroid, 158
 line field, 12

 manifold, 1
 foliated, 6
 homogeneous, 82
 non-Hausdorff, 1
 non-second-countable, 1
 metric
 bundle-like, 29
 Riemannian, 3
 on an orbifold, 41
 transverse, 25
 Molino's structure theorem, 108
 $\text{Mon}(M, \mathcal{F})$, 117
 morphism of Lie algebroids, 153
 Morse function, 58, 60
 Morse index, 59
 Morse lemma, 58
 Morse theory, 58
 multiplication map, 111

 natural transformation, 122
 Novikov's theorem, 66

 objects of a groupoid, 111
 $\Omega_{\text{bas}}^0(M, \mathcal{F})$, 83
 orbifold, 39, 141
 orientable, 43

Index

orbifold map, 39
 orbit
 in a Lie groupoid, 115
 of a Lie group action, 16
 orientation
 of a bundle, 3
 of a foliation, 12
 of an orbifold, 43
 transverse, of a foliation, 12
 orientation cover of a foliation, 15
 transverse, 15

 $\phi^*(G)$, 121
 plaque, 5
 Poincaré — Hopf theorem, 61
 Poisson manifold, 156
 product of foliations, 14
 product of Lie groupoids, 123
 proper groupoid, 140
 effective, 141
 proper map, 140
 pseudogroup, 138
 holonomy —, 139
 pull-back
 of a foliation, 14
 of a principal bundle, 145

 Reeb component, 66
 Reeb stability theorem
 global, 45
 local, 31
 Reeb — Thurston stability theorem
 global, 50
 local, 50
 de Rham cohomology, 2

 saturated subset, 31
 semi-direct product of Lie groupoids,
 125, 126
 singular locus, 40
 singularity, 58
 Morse, 58
 non-degenerate, 58
 source of an arrow, 111
 space of leaves, 6
 space of orbits of a Lie groupoid, 143
 stabilizer subgroup, 16
 stable subset, 35
 structure maps of a groupoid, 111
 submanifold, 3
 submersion, 2
 sum of Lie groupoids, 123
 suspension, 16

 tangent space, 1
 target of an arrow, 111
 torsion form, 97

Index

173

- transition, 138, 139
- transversal section, 21
 - complete, 135
- transversality, 3
- transverse parallelism, 88
- tubular neighbourhood, 3

- unit map, 111
- units of a groupoid, 112

- vanishing cycle, 66
 - negative, 66
 - positive, 66

- simple, 70
- vector field, 2
 - basic, 29
 - foliated, 29
 - G -invariant, 150
 - normal, 29
 - projectable, 29, 86
 - tangent —, 10
 - transverse, 86
- vertical vectors, 95

- $\mathfrak{X}(\mathcal{F})$, 10, 83
- $\mathfrak{X}_{\text{bas}}(\mathcal{F})$, 84
- $\mathfrak{X}_{\text{inv}}^s(G)$, 150