

Charles University Press
Charles Word 19740-4 — Lectures on Contact 3-Manifolds, Holomorphic Curves and Intersection Index

More Information

Index

adjunction formula of a closed holomorphic curve, 95 for closed holomorphic curves, 31 of a punctured holomorphic curve, 103 for punctured holomorphic curves, 65-76, Baire category theorem, 96 relative, 72, 176 Baire set, 96 almost complex manifold with cylindrical biholomorphic, 19 ends, 40, 160 binding of an open book, 77 almost complex structure, 14 blowup compatible with a contact form, 40 of a complex manifold, 16 compatible with a stable Hamiltonian of a symplectic manifold, 16 structure, 160 bordered Lefschetz fibration, 79 allowable, 83 compatible with a symplectic form, 14 integrable, 13, 18 of a symplectic filling, 84 tamed by a symplectic form, 14 braid arithmetic genus, 97, 105 linking number, 175 asymptotic contribution writhe, 175 to the *-pairing, 70 breaking contribution, 172 to the singularity index, 75 breaking orbits, 105, 168 can hide intersections, 171-172 asymptotic defect, 56 asymptotic eigenfunction, 51 extremal winding of, 70 Cauchy-Riemann type operator, 109 relative, 52 complex linear, 109, 111, 120 of class C^m , 110 asymptotic operator, 48, 159 asymptotic positivity of intersections, 70 circle compactification of a punctured asymptotic Reeb orbit, 41 Riemann surface, 41 asymptotic representative of a punctured comeager, 96 holomorphic curve, 51 compactification of moduli spaces, 20, 97, asymptotic trivializations, 57-58, 159 105, 168 asymptotic winding of a section, 56 compatible almost complex structure, 14, 40, asymptotically cylindrical map, 41, 160 160 relative homology class of, 42 completion of a symplectic cobordism, 39 automatic transversality complex blowup, 16 for closed holomorphic curves, 96 complex manifold, 13 for punctured holomorphic curves, complex structure 104 on a manifold, 13 automorphism group on a vector bundle, 14



Cherryidge University Press 53815-108149740-4 — Lectures on Contact 3-Manifolds, Holomorphic Curves and Intersection Index

More Information

Index 183

concatenation of almost complex manifolds	Giroux form, 78
with cylindrical ends, 168	Gromov's compactness theorem, 98-100
concave boundary, 35	
Conley–Zehnder index, 54	1:11 4: 6:4
connected components of a nodal	hidden at infinity
holomorphic curve, 168	double points, 65
contact action functional, 47	intersections, 63, 70
contact form, 35	zeroes of a section, 56
contact manifold, 35	Hofer energy, 104
planar, 83	holomorphic building
contact structure, 35	breakings orbits of, 168
on $S^1 \times S^2$, 38	extension of, 169
on S^3 , 37	in a concatenation, 168
on lens spaces, 38	levels, 105, 168
planar, 83	stable, 105, 169
supported by an open book, 78	holomorphic curve, 18
contact-type boundary, 35	asymptotic eigenfunction at a puncture, 51
convex boundary, 35	asymptotic representative at a puncture, 51
covering multiplicity	asymptotically cylindrical, 41, 160
of a Reeb orbit, 64	critical order of a critical point, 127, 128
of an asymptotic eigenfunction, 65, 164	critical points of, 29, 95
critical order, 127, 128	decay rate at a puncture, 51
critical points of a holomorphic curve, 29, 95	double points of, 29
cylindrical coordinates on a punctured	energy of, 97, 104
Riemann surface, 40, 174	generalized normal bundle of, 128
cylindrical ends	immersed points of, 29, 95
of a Riemann surface, 40	index of, 59, 94, 102
of an almost complex manifold, 40, 160	local singularity index at a point, 30,
of all almost complex mainfold, 40, 100	152–157
double points	multiply covered, 19, 94, 103, 151-152
hidden at infinity, 65	nodal, 20-21, 97, 168
of a holomorphic curve, 29	normal Chern number of, 30, 58, 163
of a holomorphic curve, 29	regular, 95–96, 103–104
elliptic orbit, 159	relative asymptotic eigenfunction of two
energy	punctures, 52
of a closed holomorphic curve, 97	relative decay rate of two punctures, 52
of a punctured holomorphic curve, 104	simple, 19, 94–95, 103
even Reeb orbit, 54; see also parity of a Reeb	singularity index of, 30, 164
orbit	spectral covering number of, 65, 164
exceptional sphere, 16	tangent space at a critical point, 127-130
extension of a holomorphic building, 169	holomorphic open book, 86
extremal winding, 70	holomorphic vector bundle, 111, 120
extremal winding numbers of a Reeb orbit, 54,	horizontal boundary of a Lefschetz fibration,
159	79
139	hyperbolic orbit, 159
fibration	
Lefschetz, 13	immersed points of a holomorphic curve,
	*
symplectic, 12 Fredholm regular 95, 96, 103, 104	29, 95 index
Fredholm regular, 95–96, 103–104	
concrelized tongent normal colitting 120	of a closed holomorphic curve, 94 of a punctured holomorphic curve, 59, 102
generalized tangent-normal splitting, 128 generic, 96	injectivity modulus, 153
concre. 70	IIIICCHVILV IIICUUIUS, 133



Theoly, childridge University Press Childridge University Press 5781-W8049740-4 — Lectures on Contact 3-Manifolds, Holomorphic Curves and Intersection

More Information

184 Index intersection number nodal points, 168 asymptotic contribution to, 70 nodes of a holomorphic curve, 20, 97, 168 homological, 26 nondegenerate Reeb orbit, 49 Conley-Zehnder index of, 54 local, 26 of asymptotically cylindrical maps normal Chern number (*-pairing), 63, 70 as a count of zeroes, 58 intersections of a closed holomorphic curve, 30 hidden at infinity, 63, 70 of a punctured holomorphic curve, 58, 163 hidden between levels of a building, odd Reeb orbit, 54, 159 171 - 172positivity of, 28, 148-151 open book decomposition, 77 irreducible components of a Lefschetz binding of, 77 singular fiber, 13 filled by a Lefschetz fibration, 84 holomorphic, 86 J-holomorphic curve, see holomorphic curve monodromy of, 79-81 pages of, 78 Lefschetz fibration, 13 planar, 83 allowable, 83 supporting a contact structure, 78 as filling of an open book, 84 orbit cylinder, 40, 76, 88, 106 bordered, 79 horizontal boundary of, 79 pages of an open book, 78 irreducible components of a singular fiber, parity of a Reeb orbit, 54, 159 13 planar contact manifold, 83 monodromy, 79-81 planar open book, 83 of a symplectic filling, 84 positive punctures of a holomorphic curve, 40 regular fiber of, 13 positivity of intersections, 28, 148-151 singular fiber of, 13, 97, 105 asymptotic, 70 symplectic, 15 pseudoholomorphic curve, see holomorphic vanishing cycle, 80 curve vertical boundary of, 79 linking number of two braids, 175 Reeb orbit Liouville form, 35 asymptotic, 41 Liouville vector field, 35 asymptotic operator of, 48, 159 local intersection index, 26 breaking, 105, 168 local singularity index, 30, 152-157 Conley-Zehnder index of, 54 covering multiplicity of, 64 Micallef-White theorem, 126, 127 elliptic, 159 minimal symplectic manifold, 17 even/odd, 54 moduli space extremal winding numbers of, 54, 159 compactification of, 20, 97, 105, 168 hyperbolic, 159 of closed holomorphic curves, 19 Morse-Bott, 158 virtual dimension of, 94, 95, 103 multiply covered, 54 monodromy, 79-81 negative hyperbolic, 160 Morse function, 45 nondegenerate, 49 Morse-Bott Reeb orbits, 158 parity of, 54, 159 simply covered, 54 multiply covered holomorphic curve, 19, 94, 103, 151-152 spectral covering number of, 65, 164 multiply covered Reeb orbit, 54 Reeb vector field of a contact form, 39 of a stable Hamiltonian structure, 158 negative hyperbolic orbit, 160 regular fiber of a Lefschetz fibration, 13 negative punctures of a holomorphic curve, 40

nodal holomorphic curve, 20-21, 97

relative adjunction formula, 72, 176



Theofy idge University Press Sheir Wood 49740-4 — Lectures on Contact 3-Manifolds, Holomorphic Curves and Intersection Index

More Information

Index 185

relative asymptotic eigenfunction, 52 symplectic fibration, 12 relative decay rate, 52 symplectic filling, 36 relative first Chern number, 57, 163 Lefschetz fibrations on, 84 relative homology class, 42 Stein, 83, 85 relative intersection number, 66, 161 weak, 85 Weinstein, 83, 85 Riemann surface, 18 circle compactification of, 41 symplectic form, 11 punctured, 40 supported by a bordered Lefschetz fibration, ruled surface, 12 82-83 supported by a Lefschetz fibration, 15 symplectic Lefschetz fibration, 15 second category, 96 symplectic manifold, 11 self-intersection number minimal, 17 homological, 16, 23, 30 symplectic ruled surface, 12, 18 of asymptotically cylindrical maps, 65, 75, symplectic structure 88, 163 on a manifold, 11 relative, 72, 176 on a vector bundle, 14 SFT compactness theorem, 104-107 symplectic submanifold, 11 similarity principle, 24-25, 120-126 symplectically immersed, 29, 153, 154 asymptotic analogue, 50 symplectization of a contact manifold, 39 simple holomorphic curve, 19, 94-95, 103 symplectomorphism, 12 is locally injective, 151-152 simply covered Reeb orbit, 54 tame almost complex structure, 14 singular fiber of a Lefschetz fibration, 13, 97, tangent space of a holomorphic curve, 105 127-130 singularity index of a simple holomorphic transversality curve, 30, 164 automatic, 96, 104 asymptotic contribution to, 75 for holomorphic curves, see Fredholm Sobolev spaces, 49, 110, 111 regular somewhere injective, see simple holomorphic for intersections, 26 transverse, 26 spectral covering number, 65, 164 trivial cylinder, 40, 76, 88, 106 of a holomorphic building, 106 unique continuation, 28, 95 of a nodal holomorphic curve, 97 stable Hamiltonian structure, 158 vanishing cycle, 80 standard contact structure vertical boundary of a Lefschetz fibration, 79 on $S^1 \times S^2$, 38 virtual dimension, 94, 95, 103 on S^3 , 37 on lens spaces, 38 weak symplectic filling, 85 Stein filling, 83, 85 Weinstein filling, 83, 85 symplectic blowup, 16 writhe of a braid, 175 symplectic cap, 36 symplectic cobordism, 36 zeroes of a section symplectic completion, 39 hidden at infinity, 56 symplectic deformation equivalence, 37 positivity of, 24, 128