

Contents

1	Riemann Surfaces	1
1.1	Smooth and Noded Riemann Surfaces	1
1.2	Riemann Surfaces and Hyperbolic Geometry	13
1.2.1	Stable Surfaces	13
1.2.2	The Hyperbolic Plane	16
1.2.3	Gluing Hyperbolic Surfaces Along Their Boundaries	26
1.2.4	Annuli	28
1.2.5	Hexagons in the Upper Half Plane and Pairs of Pants	32
1.2.6	Pairs of Pants Decompositions	39
1.2.7	Thick–Thin Decomposition and Collar Lemma	55
1.3	The Deligne–Mumford Compactness Result	74
1.3.1	The Notion of Convergence	80
1.3.2	The Proof of the Compactness Result for Surfaces Without Boundary	81
1.3.3	Surfaces with Boundary	94
2	Pseudoholomorphic Curves	101
2.1	Basic Definitions	101
2.2	Asymptotic Behavior Near a Puncture	117
2.2.1	Introduction	117
2.2.2	Estimates for the Linear Cauchy Riemann Operator	121
2.2.3	Regularity: Gradient Bounds Imply C^∞ -Bounds	124
2.2.4	Behavior Near an Interior Puncture	134
2.2.5	Behavior Near a Boundary Puncture	147
2.3	Isoperimetric Inequality, Monotonicity Lemma, Removal of Singularities	171
2.4	Finite-Energy Strips and Cylinders of Small Area	196
3	The SFT Compactness Results	209
3.1	Holomorphic Buildings for Curves Without Boundary	209
3.1.1	Holomorphic Buildings of Height 1	209

3.1.2	Holomorphic Buildings of Height N	211
3.2	Adding Additional Marked Points	213
3.3	The Compactness Result for the Case Without Boundary	215
3.3.1	Statement of the Result	215
3.3.2	Gradient Bounds	218
3.3.3	Convergence in the Thick Part	226
3.3.4	Convergence in the Thin Part and Level Structure	227
3.4	More General Holomorphic Buildings and Compactness Results	235
3.4.1	Holomorphic Buildings of Height 1	235
3.4.2	Holomorphic Buildings of Height N	238
3.4.3	Holomorphic Buildings in Manifolds with Cylindrical Ends	240
3.4.4	A More General Compactness Result	243
References		247
Index		251