

Contents

Chapter 1. Introduction	1
Chapter 2. Notation and preliminaries	7
Chapter 3. Initial surfaces	15
3.1. Building blocks for the initial surfaces	15
3.2. Construction of the initial surfaces	26
3.3. Basic properties of the initial surfaces and comparison with the models	34
Chapter 4. Linearized problem	41
4.1. Linearized problem on the disc and on catenoidal annuli	42
4.2. Linearized problem on the towers	44
4.3. Global solutions on the initial surfaces modulo approximate cokernel	52
Chapter 5. Solution to the nonlinear problem	59
5.1. Graphical deformation under the auxiliary metric	59
5.2. First-order correction and quadratic terms	62
5.3. Proof of the main theorem	66
Chapter 6. Desingularizing the union of two catenoidal annuli	71
Chapter 7. A Morse index bound and related conjectures	77
Appendix A. Parametrization of the Karcher–Scherk towers	89
Appendix B. Analysis on asymptotically cylindrical surfaces	99
Appendix C. Graphical deformations of immersed hypersurfaces	107
Appendix D. Asymptotic behavior of the Ketover free boundary minimal surfaces	115
Glossary	123
Bibliography	125