

Contents.

Introduction

3

Part I. THE CONCEPTS OF CHARACTERISTIC SUBMANIFOLDS AND MANIFOLDS WITH BOUNDARY-PATTERNS.

Chapter I: General theory.

§1. Definitions	19
§2. Useful boundary-patterns	22
§3. Essential maps	27
§4. Essential surfaces and useful boundary-patterns	32

Chapter II: Essential singular surfaces in some special 3-manifolds.

§5. I-bundles and Seifert fibre spaces	47
§6. Stallings manifolds	65
§7. Generalized Seifert fibre spaces	80

Chapter III: Characteristic submanifolds.

§8. Definition of a characteristic submanifold	83
§9. Existence of a characteristic submanifold	86
§10. Uniqueness of the characteristic submanifold	90

Part II. THE ENCLOSING THEOREM.

Chapter IV: Singular surfaces and characteristic submanifolds.

§11. A lemma on essential intersections	104
§12. Proof of the enclosing theorem	109

Chapter V: Singular submanifolds and characteristic submanifolds.

§13. An extension of the enclosing theorem	120
§14. Homotopy equivalences between 3-manifolds with torus boundaries	123

Part III. THE SPLITTING THEOREMS.

Chapter VI: Invariance of the characteristic submanifolds under homotopy equivalences.

§15. The preimage of an essential F-manifold	135
§16. Singular characteristic submanifolds	147

§17. The preimage of the characteristic submanifold	151
§18. Splitting a homotopy at the characteristic submanifold	155

Chapter VII: Simple 3-manifolds.

§19. Isotopic surfaces in simple 3-manifolds	159
§20. Splitting a homotopy equivalence at a surface	165
§21. Splitting a homotopy at a surface	170

Part IV. THE CONCLUSION OF THE PROOF OF THE CLASSIFICATION THEOREM.

Chapter VIII: Attaching homotopy equivalences.

§22. The induction beginning	174
§23. The induction step	177
§24. The classification theorem	181

Part V. LOCAL CONSTRUCTIONS FOR HOMOTOPY EQUIVALENCES.

Chapter IX: Dehn twists of 3-manifolds.

§25. On the mapping class group of Seifert fibre spaces	188
§26. Homeomorphisms of I-bundles	205
§27. On the mapping class group of 3-manifolds	213

Chapter X: Dehn flips of 3-manifolds.

§28. Geometric obstructions for homotopy equivalences	227
§29. On the homotopy type of 3-manifolds and the isomorphism problem for 3-manifold groups	243

Part VI. APPENDIX.

Chapter XI: Homotopy equivalences of surfaces and I-bundles

§30. Homotopy equivalences of surfaces	251
§31. Homotopy equivalences of product I-bundles	274

Chapter XII: Geometric properties of 3-manifold groups.

§32. The influence of exceptional curves on 3-manifold groups	280
---	-----

References	297
------------	-----

Index	301
-------	-----