

Contents

1	Inverse Limits on Intervals	1
1.1	Basic properties of inverse limits on the interval $[0, 1]$	1
1.2	Examples and remainders of topological rays	6
1.3	Inverse limits on $[0, 1]$ with only one bonding map	13
1.4	Period three implies indecomposability	19
1.5	Inverse limits with only one map of an interval	22
1.6	Inverse limits on intervals with sequences of maps	26
1.7	Inverse limits with unimodal bonding maps	27
1.8	Logistic maps and their inverse limits	31
1.9	The piecewise linear family of unimodal maps f_{ab}	48
1.10	The tent family	52
1.11	Other families of mappings	55
1.11.1	The family \mathcal{F}	55
1.11.2	The family \mathcal{G}	56
1.11.3	Markov maps	57
1.11.4	Permutation maps	58
1.12	Characterization of inverse limits on $[0, 1]$ as chainable continua	59
1.13	An inverse limit homeomorphic to a $\sin(1/x)$ -curve	67
	References	73
2	Inverse Limits in a General Setting	75
2.1	Introduction	75
2.2	Definitions and a basic theorem	76
2.3	Graphs of upper semi-continuous functions	78
2.4	Consistent systems	79
2.5	Compact inverse limits	80
2.6	Connected inverse limits	83
2.6.1	Systems in which all of the bonding functions are mappings	85

2.6.2	Systems in which the directed set is totally ordered . . .	86
2.7	Examples in the special case that each factor space is $[0, 1]$. .	90
2.8	Mapping theorems	104
2.9	Upper semi-continuous functions that are unions of functions	111
2.10	Inverse limit systems with mappings	115
2.10.1	A basis for the topology	115
2.10.2	Closed subsets	115
2.10.3	Closed subsets of a system with upper semi-continuous bonding functions	117
2.10.4	Intersections of closed subsets of the inverse limit	117
2.10.5	The subsequence theorem	119
2.10.6	Other induced homeomorphisms	120
2.10.7	Inverse limits as sequential limiting sets	121
2.10.8	Inverse limits as intersections of closed sets	122
2.11	Inverse limits with metric factor spaces	122
2.12	Dimension	124
References		129
3	Inverse Limits in Continuum Theory	131
3.1	Introduction	131
3.2	Indecomposability, atriodicity, and unicoherence	131
3.2.1	Indecomposability	132
3.2.2	Triods and atriodicity	133
3.2.3	Unicoherence	134
3.2.4	Irreducibility	135
3.3	Monotone bonding maps	137
3.4	Irreducibility and indecomposability	138
3.5	Closed subsets	142
3.5.1	The full projection property	142
3.6	Indecomposability of inverse limits with upper semi- continuous bonding functions	146
3.7	Continua that cannot be obtained with one bonding function	147
3.8	Additional topics	148
3.8.1	Span	149
3.8.2	Property of Kelley	150
3.8.3	Fixed point property	151
3.8.4	Hyperspaces	152
References		153
4	Brown's Approximation Theorem	155
4.1	Introduction	155
4.2	Brown's theorem	155
4.3	An application of Brown's theorem	161

References	165
5 Appendix: An Introduction to the Hilbert Cube	167
5.1 Introduction	167
5.2 A brief introduction to topology	167
5.3 The Hilbert cube	169
5.3.1 The metric topology for \mathcal{Q}	170
5.3.2 The product topology for \mathcal{Q}	170
5.3.3 The metric topology and the product topology for \mathcal{Q} are identical	171
5.4 A countable basis for the topology of \mathcal{Q}	171
5.5 \mathcal{Q} is compact	172
5.6 \mathcal{Q} is connected	175
5.7 Consequences of compactness	177
5.8 Continuity	178
5.9 Arcs	179
5.10 Boundary bumping	180
References	187
Bibliography	189
Index	215

Inverse Limits

From Continua to Chaos

Ingram, W.T.; Mahavier, W.S.

2012, XVI, 220 p., Hardcover

ISBN: 978-1-4614-1796-5