## Contents

ICE Bruck loops in algebraingt

The Topological and differentiable Bruchplosopanital most fint languages in a 129

Products and loops as sections/appendigible triefgroupsgratin fiel vignout? 1755	
Preface  Pre	V
Notation agreement to a second and a second agreement to a second agreement agreement to a second agreement to a second agreement agreem	VII
Introduction	
2 A fundamental reduction	
Part I of groups of groups of Part I	
General theory of transitive sections in groups and the geometry of loops	16
Sharply transitive normal subgroups 208	
1 Elements of the theory of loops	13
1.1 Basic facts on loops	13
1.2 Loops as sections in groups	17
1.3 Topological loops and differentiable loops	29
2 Scheerer extensions of loops	42
3 Nets associated with loops	53
4 Local 3-nets statement manifolds at 2 Local 3-nets	60
5 Loop-sections covered by 1-parameter subgroups and geodesic loops	65
6 Bol loops and symmetric spaces	80
702 Bol nets solvable left translation groups	95
8 Strongly topological and analytic Bol loops	100
9 Core of a Bol loop and Bruck loops	102
9.1 Core of a Bol loop	
9.2 Symmetric spaces on differentiable Bol loops	113
10 Bruck loops and symmetric quasigroups over groups	120

X Contents

11 Topological and differentiable Bruck loops	129
12 Bruck loops in algebraic groups	143
13 Core-related Bol loops	150
14 Products and loops as sections in compact Lie groups	166
14.1 Pseudo-direct products	166
14.2 Crossed direct products	168
14.3 Non-classical differentiable sections in compact Lie groups	170
14.4 Differentiable local Bol loops as local sections in compact Lie groups	173
15 Loops on symmetric spaces of groups	174
15.1 Basic constructions	174
15.2 A fundamental reduction	182
15.3 Core loops of direct products of groups	186
15.4 Scheerer extensions of groups by core loops	190
16 Loops with compact translation groups and compact Bol loops	194
17 Sharply transitive normal subgroups	208
Basic facts on loops	
Loops as sections in groups II and a square in	
Smooth loops on low dimensional manifolds	
icheerer extensions of loops	
18 Loops on 1-manifolds	235
19 Topological loops on 2-dimensional manifolds	249
20 Topological loops on tori	256
21 Topological loops on the cylinder and on the plane	262
21.1 2-dimensional topological loops on the cylinder	262
21.2 Non-solvable left translation groups	264
22 The hyperbolic plane loop and its isotopism class	276
23 3-dimensional solvable left translation groups	289
23.1 The loops $L_{(\alpha)}$ and their automorphism groups	290
23.2 Sharply transitive sections in $\mathfrak{L}_2 \times \mathbb{R}$	298
23.3 Sections in the 3-dimensional non-abelian nilpotent Lie group	308
23.4 Non-existence of strongly left alternative loops	312

Contents

24 4-dimensional left translation group	317
25 Classification of differentiable 2-dimensional Bol loops	321
26 Collineation groups of 4-dimensional Bol nets	329
27 Strongly left alternative plane left A-loops	335
28 Loops with Lie group of all translations	338
29 Multiplicative loops of locally compact connected quasifields 29.1 2-dimensional locally compact quasifields 29.2 Rees algebras $Q_{\varepsilon}$ 29.3 Mutations of classical compact Moufang loops	344 345 346 348
Bibliography	351
Index oop as a section in the group generated by mem. The development of the soft loops and centergroups in the statest at reasonable in the solution the sections. An emportant representative for the study of loops, quasigroups and associated geometry as abstract objects is \$2.00. Released [97]. The six estigate loops within the framework of topological algebra, topological geometry and ential geometry gained importance by the work of A. I. Malcey [89]. K. H. Por [47], H. Satzmann [120] and M. A. Aldvis [13]. The usefulness of analysis method the theory of loops is shown in the work of L. V. Sabinin [116]. All these transitive the decrease is an algebra as a part of group theory. This is treat loops as sharply transitive sections in avoing Henry the group theoretical first of the groups are sharply transitive sections in avoing Henry algebra. We restrict our analysis we predominates the methods of post-associative algebra. We restrict our analysis world or groups in which the simple objects are glassified (e.g. finite grates) groups. The groups we shall use systematically also differ sharply transitive sections in Lie groups we shall use systematically also differ	
geometric methods. From incidence structures we shall substantially use 3 nets are the geometries associated with loops, they are the worst importanticed for processing isotopism classes of loops. The local version of differentiable 3 me between which are coordinatized by local differentiable loops. Since the the 3-webs is systematically studied and the application of results on local loops of add in the global theory, the local point of with of 3-web geometry and the the differentiable loops belong to the arsenal of our methods.  Binary operations "A" $M \times M \mapsto M$ for a set 16 with the property that for the $h \in M$ the equations $h \times M \mapsto M$ for a set 16 with the property that for the $h \in M$ the equations $h \times M \mapsto M$ for a set 16 with the property that for the left transformations $h \times M \mapsto M$ and $h \mapsto M$ for a set 16 with the property that $h \mapsto M \mapsto M$ the left transformations $h \mapsto M \mapsto M \mapsto M$ are the property of $M$ .	