

Contents

Introduction	1
1 Smooth manifolds and F-smooth spaces	5
1.1 Smooth manifolds	5
1.2 F-smooth spaces	6
1.2.1 F-smooth spaces	6
1.2.2 F-smooth subspaces	9
1.2.3 F-smooth maps	10
1.2.4 Cartesian product of F-smooth spaces	13
1.3 Smooth manifolds as F-smooth spaces	14
2 Systems of maps	17
2.1 Smooth systems of smooth maps	17
2.1.1 Smooth systems of smooth maps	17
2.1.2 Smooth structure of (\mathcal{S}, ϵ)	22
2.1.3 Smooth tangent prolongation of (\mathcal{S}, ϵ)	23
2.2 F-smooth systems of smooth maps	26
2.2.1 F-smooth systems of smooth maps	27
2.2.2 F-smooth tangent prolongation of (\mathcal{S}, ϵ)	32
2.3 F-smooth vs smooth systems of maps	39
3 Systems of sections	43
3.1 Smooth systems of smooth sections	43
3.1.1 Smooth systems of smooth sections	43
3.1.2 Smooth structure of $(\mathcal{S}, \zeta, \epsilon)$	47
3.1.3 Smooth lifted fibred manifold	49
3.2 F-smooth systems of smooth sections	50
3.2.1 F-smooth systems of smooth sections	50
3.2.2 F-smooth structure of \mathcal{S}	54
3.2.3 F-smooth tangent prolongation of $(\mathcal{S}, \zeta, \epsilon)$	62
3.2.4 F-smooth differential operators	75
3.3 F-smooth vs smooth systems of sections	77
4 Systems of connections	81
4.1 Smooth systems of smooth connections	82
4.1.1 Smooth systems of smooth connections	82
4.1.2 Smooth universal connection	86
4.2 F-smooth systems of connections	93

5	F-smooth connections	97
5.1	F-smooth connections	97
5.2	F-smooth connections in the linear case	99
6	Applications	103
6.1	Introduction to Covariant Quantum Mechanics	103
6.2	System of observed quantum connections	111
6.3	Quantum dynamics	114
6.4	F-smooth sectional quantum fibred set	116
6.5	F-smooth sectional quantum bundle	118
6.6	The pre-Hilbert sectional quantum bundle	119
6.7	Schrödinger connection	120
	List of Symbols	123
	Index	126
	Bibliography	127