Contents

Introduction				
1	Hop	of algebras	7	
	1.1	Basic definitions	7	
		1.1.1 Algebras, coalgebras, bialgebras and Hopf algebras	7	
		1.1.2 Action and coaction	13	
		1.1.3 Duality	15	
		1.1.4 Limits and colimits	18	
	1.2	Invariants and coinvariants	19	
	1.3	Hopf-Galois extensions	20	
	1.4	Hopf-Galois descent	23	
2	Fin	ite Hopf-Galois theory for separable field extensions	27	
	2.1	Introduction	27	
	2.2	The Greither-Pareigis group	28	
	2.3	H-subextensions and H -stable extensions	33	
	2.4	The space of invariants of a Hopf-Galois extension	37	
	2.5	Correspondence theorem for Hopf-Galois extensions	41	
	2.6	Relation with the Greither-Pareigis group	45	
	2.7	Opposite Hopf-Galois structures	52	
	2.8	Intersection, compositum and compatible Hopf-Galois extensions	59	
	2.9	Examples	64	
		2.9.1 Canonical Galois extensions	64	
		2.9.2 Almost classical Galois extensions	64	

Contents

3	Infi	nite Hopf-Galois theory	67		
	3.1	Finite topologies	67		
	3.2	Definition of infinite Hopf-Galois extensions	68		
	3.3	Properties of finite H-normal extensions	71		
	3.4	Topology on H	74		
	3.5	Correspondence theorem between open Hopf ideals and finite H-normal			
		intermediate extensions	75		
	3.6	Example	76		
4	Research perspectives				
	4.1	The Van Oystaeyen-Zhang transform	79		
	4.2	Infinite Hopf-Galois extensions and profinite Hopf algebras	80		
Bi	Bibliography				