These distinct results use a common approach, which has been developed recently. It consists of establishing first a reduction to an intermediate structure called the leading term structure, or RV-sort, and then of reducing to the value group and residue field. This leads us to develop similar reduction principles in the context of pure short exact sequences of abelian groups.

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TINGXIANG ZOU, ***Pseudofinite Structures and Counting Dimensions,*** Université de Lyon, Lyon, France, 2019. Supervised by Frank Wagner. MSC: 03C20. Keywords: pseudofinite structure, pseudofinite counting dimension, H-structure, pseudofinite difference field, primitive permutation groups, approximate subgroup.

Abstract

The thesis *pseudofinite structures and counting dimensions* is about the model theory of pseudofinite structures with the focus on groups and fields. The aim is to deepen our understanding of how pseudofinite counting dimensions can interact with the algebraic properties of underlying structures and how we could classify certain classes of structures according to their counting dimensions. Our approach is by studying examples. We treat three classes of structures: The first one is the class of H-structures, which are generic expansions of existing structures. We give an explicit construction of pseudofinite H-structures as ultraproducts of finite structures. The second one is the class of finite difference fields. We study properties of coarse pseudofinite dimension in this class, show that it is definable and integer-valued and build a partial connection between this dimension and transformal transcendence degree. The third example is the class of pseudofinite primitive permutation groups. We generalise Hrushovski's classical classification theorem for stable permutation groups acting on a strongly minimal set to the case where there exists an abstract notion of dimension, which includes both the classical model theoretic ranks and pseudofinite counting dimensions. In this thesis, we also generalise Schlichting's theorem for groups to the case of approximate subgroups with a notion of commensurability.

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