

Chapter four is mostly devoted to the investigation of uniformly regular measures and charges (on both Boolean algebras and topological spaces). We show how the properties of a charge on a Boolean algebra can be transferred to the induced measure on its Stone space. We give a different proof to a result by Mercourakis. In 2013, Borodulin-Nadzieja and Džamonja proved the countable version of Maharam Theorem for charges using uniform regularity. We show that this result can be proved under weaker assumption and further extended.

The final Chapter is concerned with the higher versions of uniform regularity which are called uniform κ -regularity. We study these types of measures and obtained several results and characterizations. The major contribution to this work is that we show we cannot hope for a higher analogue of Maharam Theorem for charges using uniform κ -regularity. We prove that a higher version of analogue of Maharam Theorem can be proved only for charges on free algebras on κ many generators (resp. measures on a product of compact metric spaces). We also generalize a result proved by Grekas and Mercourakis for Jordan algebras.

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MICHEAL PAWLIUK, *Amenability and Unique Ergodicity of the Automorphism Groups of all Countable Homogeneous Directed Graphs*, University of Toronto, Canada, 2015. Supervised by Vladimir Pestov and Stevo Todorčević. MSC: 43A07, 05C55, 54H20, 05C20. Keywords: amenable groups, directed graphs, tournaments, Fraïssé classes.

Abstract

We establish the amenability, unique ergodicity, and nonamenability of various automorphism groups from Cherlin's classification of countable homogeneous directed graphs. This marks a complete understanding of the amenability of the automorphism groups from this list, and except for the Semigeneric graph case, marks a complete understanding of the unique ergodicity of these groups.

Along the way we establish that a certain product of Fraïssé classes preserves amenability, unique ergodicity, and the Hrushovski property. We also establish the unique ergodicity of various other automorphism groups of Fraïssé structures that do not appear in this classification.

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PHILLIP WESOLEK, *The Global Structure of Totally Disconnected Locally Compact Polish Groups*, The University of Illinois at Chicago, USA, 2014. Supervised by Christian Rosendal. MSC: 54H05. Keywords: totally disconnected locally compact groups, Polish groups.

Abstract

This thesis considers the class of totally disconnected locally compact (t.d.l.c.) Polish groups. These groups appear throughout mathematics, and moreover, they are particularly amenable to study via descriptive-set-theoretic methods. This work consists of two main threads of research. The first isolates and explores a natural dividing line in the class of t.d.l.c. Polish groups. The second is more group-theoretic in nature and considers the structure of t.d.l.c. Polish groups.

The elementary groups are first isolated; this class is motivated by a desire to capture the groups “built by hand” from profinite Polish groups and countable discrete groups. The class of elementary groups can be defined as the smallest class of t.d.l.c. Polish groups that contains the profinite Polish groups and the countable discrete groups and that is closed under taking closed subgroups, Hausdorff quotients, group extensions, and countable unions of open