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Representations of flows and generalized Rudolph's theorem [Abstract of thesis]

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ultrafilter are the basis of a proof of the generalization of the classical Gödel's completeness theorem:

A formula φ is α–theorem, $\mathcal{T} \vdash_\alpha \varphi$, iff it is α–valid in the theory $\mathcal{T}$, $\mathcal{T} \models_\alpha \varphi$.

REPRESENTATIONS OF FLOWS AND GENERALIZED RUDOLPH'S THEOREM

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Problems connected with representations of flows are investigated in the thesis. The first part refers to the decomposition of a flow (formed by a very general contin uous group of homeomorphisms of a Polish space) into ergodic components without any substantial assistance of a measure. It is proved at the same time that the sets of quasiregular and regular points are Borel of the type $G_{\delta\sigma\delta}$, too. In the second part, there is solved the problem of the representability of a measurable flow $\{T_t\}_{t\in R}$ on a probability space by a canonical one, i.e. by a flow under the function taking only two (irrationally related) values, whose pro–images form a (two–element) generator of the basic automorphism. To this end an auxiliary invariant, the asymptotic rate of the flow, is introduced (in the case of countably generated σ–algebra in the state space). It is shown that the asymptotic rate of the flow under the function is closely related to the asymptotic rate of the basic automorphism. Thus, the use of the theorem on the minimal cardinality of the generator allows us to find the necessary and sufficient condition of the representability of an aperiodic measurable flow by means of a canonical one. This condition is just the finality of the asymptotic rate. As the asymptotic and entropy rates are equal in the case of the ergodic flow, the Rudolph's theorem was generalized to the non–ergodic case.

APPLICATION OF THE FACTORIZATION THEOREM FOR STONE ALGEBRAS IN LOCALES

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The theory of locales (Stone spaces, Stone algebras) has been invented to study topology by means of lattice theory. One of the most important notions to be investigated is the concept of a subspace of a Stone space. As shown elsewhere, it corresponds to the concept of a quotient Stone algebra.

In the present work we prove a theorem characterizing quotient Stone algebras obtained by an arbitrary system of relations. This allows to construct spaces from generators and defining relations. Our main aim is to study the applications of this method.

The basic theorem is proved in Chapter 1. In Chapter 2 we prove Tychonoff's theorem for locales without the axioms of choice and replacement. This strengthens a result of P.T.Johnstone and solves his problem.