several bounds and consistency results, e. g. the consistency of $\mathfrak{s} < \mathfrak{s}_{1/2}$ and $\mathfrak{s}_{1/2} < \mathrm{non}(\mathcal{N})$, as well as several results about possible values of $\mathfrak{i}_{1/2}$. Most proofs are of a combinatorial nature; one of the more sophisticated proofs utilises a creature forcing poset already introduced in Chapter B.

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Abstract prepared by Lukas Daniel Klausner.
E-mail: mail@l17r.eu
URL: http://repositum.tuwien.ac.at/urn:nbn:at:at-ubtuw:1-116736

Ari Meir Brodsky, ***A Theory of Stationary Trees and the Balanced Baumgartner–Hajnal–Todorcevic Theorem for Trees***, University of Toronto, Canada, 2014. Supervised by Stevo Todorcevic. MSC: Primary 03E02, Secondary 03C62, 05C05, 05D10, 06A07. Keywords: combinatorial set theory, nonspecial trees, stationary trees, stationary subtrees, partial orders, diagonal union, regressive function, normal ideal, Pressing-Down Lemma, balanced partition relation, partition calculus, Erdős–Rado Theorem, Baumgartner–Hajnal–Todorcevic Theorem, elementary submodels, nonreflecting ideals, very nice collections.

Abstract

Building on early work by Stevo Todorcevic, we develop a theory of stationary subtrees of trees of successor-cardinal height. We define the diagonal union of subsets of a tree, as well as normal ideals on a tree, and we characterize arbitrary subsets of a nonspecial tree as being either stationary or nonstationary.

We then use this theory to prove the following partition relation for trees:

Main Theorem. *Let κ be any infinite regular cardinal, let ξ be any ordinal such that $2^{|\xi|} < \kappa$, and let k be any natural number. Then*

$$\textit{non-}(2^{<\kappa})\textit{-special tree} \rightarrow (\kappa + \xi)^2_k .$$

This is a generalization to trees of the Balanced Baumgartner–Hajnal–Todorcevic Theorem, which we recover by applying the above to the cardinal $(2^{<\kappa})^+$, the simplest example of a non-$(2^{<\kappa})$-special tree.

An additional tool that we develop in the course of proving the Main Theorem is a generalization to trees of the technique of nonreflecting ideals determined by collections of elementary submodels.

As a corollary of the Main Theorem, we obtain a general result for partially ordered sets:

Theorem. *Let κ be any infinite regular cardinal, let ξ be any ordinal such that $2^{|\xi|} < \kappa$, and let k be any natural number. Let P be a partially ordered set such that $P \rightarrow (2^{<\kappa})^1_{2^{<\kappa}}$. Then*

$$P \rightarrow (\kappa + \xi)^2_k .$$

Abstract prepared by Ari Meir Brodsky.
E-mail: ari.brodsky@utoronto.ca
URL: http://hdl.handle.net/1807/68124

Aaron Thomas-Bolduc, ***New Directions for Neo-logicism***, University of Calgary, Canada, 2018. Supervised by Richard Zach. MSC: 00A30, 03A99. Keywords: neo-logicism, philosophy of mathematics, arithmetic, analysis.