FORMULAS OVER MINIMAL STRUCTURES

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We present one purely syntactic result on the structure of formulas over a minimal non-ordered structure (in the sense of [1])with the definable generic type.Let M be such a structure.

Definition 1. Let $\varphi(x;\bar{y})$ be a formula over M with free variables $y = (y_1, y_2, \dots, y_n)$and x.We say the variable x is*tame* if the set $\varphi(M;\bar{b})$ is finite for any $\bar{b} \in M$.

Definition 2. A formula over $M$is called *tame* if every free variablein it is tame.

Theorem. Each formula over M is equivalent to a Boolean combination of tame formulas.

References

1. K. Krupiński, P. Tanović and F. O. Wagner, Around Podewski's conjecture, arXiv:1201.5709v2.

SOME PROPERTIES OF COUNTABLE MODELS OF SMALL ORDERED THEORIES

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The report is devoted to the properties of countable models of small theories.A theorem is proved (together with T. Zambarnaya) on the existence of models over a countable set.All built models have the same finite diagram.In addition, the report considers conditions on 1-types of small ordered theories in terms of 2-formulas acting on the set of realizations of 1-type that provide the maximum number of countable models.

PERMUTATION GROUPS OF FINITE MORLEY RANK

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Binding groups are model-theoretic analogues of Galois groups; they were introduced in the 1970s by Zilber. They are very natural mathematical objects; to explain that we need a few words about permutation groups.

Given a permutation group G on a set X,a subset of X is said to be a base for G if its pointwise stabilizer in G is trivial. The minimal size of a base for G is denoted by $b(G)$. Finite bases, if exist, yield parameterizations, in terms of X, and structural analysis of group actions: if $b_1, \dots, b_n$ is a base, each permutation $g \in G$ is uniquelly determined by an n-tuple $(b_1^g, \dots, b_n^g) \in X^n$.

Now let X be a finite dimensional vector space and G its automorphism group. A basis of X as a vector space is also a base for the action of G, and elements of G can be encoded as images of this base, that is, finite tuples of vectors, commonly known as matrices; the dependencies between vectors in the space allow us to express composition of automorphisms as product of matrices: the group G becomes *definable in* X. It was Zilber's seminal discovery that a similar construction can be carried out over a vast class of mathematical structures which have good logic properties of 'dependency' between elements (although the nature of this dependency could be far away from that of linear dependency in vector spaces).

Groups of finite Morley rank emerged as binding groups in Zilber's analysis of arbitrary $\aleph_1$-categorical structures; this made them a focal point of model theoretic algebra. They are abstract groups equipped with a suitable notion of dimension called Morley rank on definable sets. When they are viewed as permutation groups (so have a definable faithful action), they have finite bases and allow deep structural analysis. What is important, groups of finite Morley rank were born as binding, hence permutation groups, and their study as permutation groups yields a very rich theory.

The talk will be an attempt to give a survey, at the background of rich history, of recent advances in the theory of permutation groups of finite Morley rank.

SIMPLE GROUPS OF FINITE MORLEY RANK

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One of the still unresolved questions coming from the foundations of geometrical stability theory is the algebraicity problem for simple groups of finite Morley rank. We give a broad overview of the status of that problem and touch on its connections with the theory of permutation groups of finite Morley rank, notably the problem of generic multiple transitivity.

THE COMPUTABILITY OVER ABSTRUCT MODELS

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The problem of computability over abstract structures was studied in different works. First idea was to consider only countable models and interesting approach was created by definition of the computable (recursive) structures by O. Rabin, A. Frohlich and J. Shepherdson, A. Malcev. Later it was constructed different ideas to define directly construction of computability over different structures without numberings over abstract structures by Y. Moschovakis, G. Sacks, Yu. Ershov.Yu.Ershov suggested to consider from admissible theory to use some HF-superstructure over abstract model added new hereditaryfinite subsetsand the theory of definability in this special classes of formulas. But this theory was with some problem for applications in programming and we started to constructed on this base the computability over HW-superstructures on the base hereditary finite lists. And on this base was built the theory of semantic programming and created some applications in Programming together with Yu. Ershov and D. Sviridenko and other our collegues. The main idea was constructed programming language to create program on the base of formal specifications to solve problems of control system. One approach for research was connected with arbitrary uncountable classical mathematical structure and computability property on them. We study problems of computability and polynomial computability for abstruct structures. Together with A. Nechesov we found the polynomial version of Gandy theorem and constution logic programming language for polynomial computability/ Another approach was with logical aspects in programming and The theory of semantic programming and semantic modeling were donetogether with Yu.L. Ershov, E.E. Vityev, D.I. Sviridenko, A. Nechesov, A. Mancivoda, V. Gumirov and others. Last time it is very interesting programming applications were done forAI and control systems by V. Gumirov, A. Mancivoda and E. Vityaev.