REVIEW

of scientific supervisor, doctor of physical and mathematical sciences, Corresponding member of the National Academy of Sciences of the Republic of Kazakhstan B.Sh. Kulpeshov on the dissertation of Sayan Samatovich Baizhanov on the theme "Properties preservation of expansion of models of NIP theories" submitted for the degree of Doctor of Philosophy (PhD) in the specialty 6D060100 – Mathematics

The dissertation of Sayan Baizhanov belongs to the field of Model Theory, one of the modern and important branches of Mathematical Logic. Classification of models of a complete theory up to an isomorphism is one of the main tasks of Model Theory. Questions of preservation of various properties of an expanded theory are very interesting and important in the direction of such a classification. Leading specialists in model theory got deep results in different problems of expansions (expansion by elementary substructures, automorphisms, non-elementary substructures, non-indiscernible sets etc.): strongly minimal theories (B.I. Zilber, E. Hrushovski and others), omega-stable (A. Nesin, B. Poizat, G. Cherlin and others), superstable (E. Bouscaren, T.G. Mustafin and others), weakly o-minimal (D. Macpherson-D. Marker-Ch. Steinhorn, B.S. Baizhanov and others) et cetera.

The dissertation of Sayan Baizhanov is devoted to studying preservation of properties of expansions of models by new relations in the class of dependent theories (NIP, i.e. without the independence property), which includes both stable theories and ordered theories without the independence property.

The dissertation consists of eight chapters. The first chapter contains common definitions, the second – notations and abbreviations, the third chapter is an introduction, which describes the aims and objectives of the dissertation. The fourth chapter is devoted to a historical overview. The main results of the dissertation are contained in Chapters 5-8.

The fifth chapter is devoted to questions of expansions of weakly o-minimal theories by unary predicates. Here it is proved that an expansion of a model of countably categorical weakly o-minimal theory of finite convexity rank preserves both the countable categoricity and convexity rank. As a corollary, in case of quite o-minimality such an expansion also additionally preserves quite o-minimality.

The sixth chapter is devoted to questions of expansions of weakly o-minimal theories by equivalence relations. Here a criterion for preserving both the countable categoricity and weak o-minimality of an expansion of a 1-indiscernible countably categorical weakly o-minimal theory of finite convexity rank by an equivalence relation partitioning the universe into infinitely many infinite convex classes is presented.

The seventh chapter is devoted to questions of expansions of weakly o-minimal theories by arbitrary binary predicates. Here two criteria for preservation of the countable categoricity for a weakly o-minimal expansion of a countably categorical weakly o-minimal theory of convexity rank 1 by an arbitrary binary predicate in case of both 1-indiscernibility and non-1-indiscernibility are proved.

The eighth chapter is connected with the notion of external definability, and presents the theorem on preservation of weak o-minimality for an expansion of a weakly o-minimal group by an externally definable binary predicate. At last, the theorem on preservation of model completeness for an expansion of a model of a weakly o-minimal model complete theory by a unary predicate is presented.

As a supervisor, I note that in the process of writing his dissertation, Sayan grew into a real young scientist and researcher who can successfully work in model theory due to his qualities such as hard work, perseverance, a deep understanding of model-theoretic properties of complete theories, mastery of modern methods of studying properties of expanded models, the ability to creatively solve the tasks assigned to him, to find unexpected solutions.

All the results of the dissertation were tested at many international conferences and seminars, and the main results of the dissertation are published in domestic and foreign rating scientific journals.

I believe that the dissertation of Sayan Baizhanov meets all the requirements for the degree of Doctor of Philosophy (PhD), and its author deserves the degree of Doctor of Philosophy (PhD) in mathematics.

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