

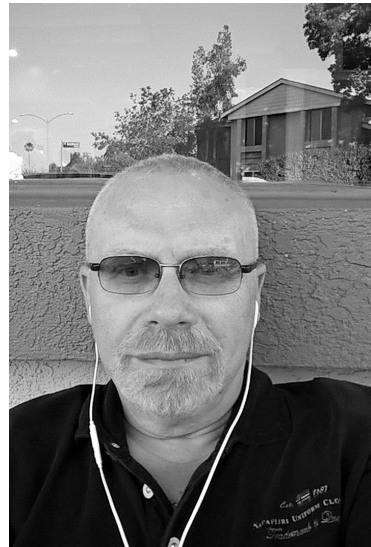
## IGOR YA. SUBBOTIN

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*(dedicated to the 70th birthday)*

On March 25, 2020, Professor Igor Ya. Subbotin turned 70. In 1967 Igor enrolled in Kiev National Pedagogic University. Soon Igor Subbotin became one of the first members of the famous Kiev Group Theory Seminar at the Institute of Mathematics of National Academy of Sciences of Ukraine. At that seminar Igor Subbotin established friendly relations with many other young mathematicians. This warm and fruitful friendship continued for decades and led to many collaborative works.

In 1972 Igor Subbotin graduated with the highest honors from Kiev National Pedagogical University. In December 1972 his



master thesis was published in Mathematical Notes (Matematicheskije Zametki). S. N. Chernikov and the Department of Higher Mathematics highly recommended him for Ph.D. studies, but because of some political reasons Igor’s application was rejected by the so-called “public organizations”, as they were known at that time. Igor became a teacher at Kiev High School #145 where he worked for more than 8 years. He always recalls these years as a very productive and fruitful period of his life that greatly impacted his future career and formed his personality and interest in teaching mathematics.

In 1978 I. Ya. Subbotin was awarded his Ph.D. at Mathematics Institute of the National Academy of Science of Ukraine. Igor’s thesis in group theory was written under supervision of Professor S. N. Chernikov. In 1980 Igor Subbotin became an Associate Professor of the Department

of Higher Mathematics of KPI–Kiev Polytechnic Institute (now Kiev National Technology University). Those 12 years of working at KPI played a key role in forming Igor’s skills in teaching of university level mathematics. He is especially thankful to the Chair of the Department, Professor Fedor T. Baranovskii, who was Igor’s influential mentor in that process.

In 1993, Igor began his teaching and research career at the National University, California, USA, where he has been working since that time. He is a Full Professor and Academic Director of mathematics programs there. I. Ya. Subbotin always speaks highly about the great support of his research and teaching activities by the National University.

Igor Subbotin is very active in research. His list of publications includes more than 150 research articles in algebra published in major mathematics journals in many countries including Ukraine, USA, Germany, Switzerland, Great Britain, Italy, Spain, China, Brazil, Hungary, Czech Republic, Turkey, Poland, and Russia, 12 books in algebra, and more than 50 papers in mathematics education.

In early seventies, I. Ya. Subbotin began his work on some aspects of the normal structure of finite and infinite groups. This area of research takes its roots in the works of R. Dedekind, O. Yu. Schmidt, S. N. Chernikov, R. Baer, and O. Taussky. I. Ya. Subbotin focused on studying groups with given properties of their normal subgroups and their generalizations. His first steps in research were generalizations of the well-known  $T$ -groups, i.e. groups with transitivity of normality. This topic has recently attracted a lot of attention. It largely focuses on various interesting types of subgroups, both close to normal and their antipodes. The role and influence of such subgroups is particularly strong in the theory of finite groups. I. Ya. Subbotin was initiated the study of these subgroups in infinite groups. The situation here is very different from what we can observe in the theory of finite groups. For example, in some classes of infinite groups, pronormal subgroups have properties that they cannot possess in the finite case.

In this connection, we want to mention an important result : description by I. Subbotin and N. F. Kuzennyi of all infinite groups, having all subgroups pronormal. In collaboration with L. A. Kurdachenko, N. F. Kuzennyi, J. Otal, G. Vincenzi, A. Russo and others, I. Ya. Subbotin studied some important properties of pronormal, Carter, abnormal, contranormal and other related types of subgroups of infinite groups and their influence on the groups structure. Some new criteria of local nilpotency and nilpotency in infinite groups were shown to be related to these subgroups and a natural generalization of the notion of a Carter subgroup in the case of infinite groups have been found in this way. Also, important classes

of groups saturated with above mentioned subgroups and groups with transitivity of these subgroup properties have been described.

These works relied not only on the use of purely group-theoretic techniques. In some cases the authors had to use module theory. Moreover, often this theory had to be expanded. The obtained results became the basis for two books written jointly by L. A. Kurdachenko and J. Otal: *Groups with prescribed quotient groups and associated module theory*, World Scientific: New Jersey, London, Singapore, Hong Kong, 2002; and *Artinian modules over group ring*, Frontiers in Mathematics, Birkhäuser: Basel, 2007.

Another area of algebra that required special study was the theory of infinite-dimensional linear groups. Theory of finite-dimensional linear groups is one of the most developed algebraic theories. However the theory of infinite-dimensional linear groups is only at an initial level. The application of finite-dimensionality conditions proved to be very effective here. In particular, it was demonstrated in the theory of finitary linear groups. The concept of groups of finite central dimension, introduced by L.A. Kurdachenko, opens new opportunities for description of some naturally defined classes of infinite dimensional linear groups that are close to ordinary finite-dimensional groups. Based on this approach, interesting results on infinite-dimensional linear groups have been obtained lately by L. A. Kurdachenko, M. Evans, M. Dixon, I. Ya. Subbotin, J. Otal, J.-M. Munos-Escolano, and N. N. Semko.

Another approach, based on the study of various important families of  $G$ -invariant subgroups, was implemented by I. Ya. Subbotin in collaboration with L. A. Kurdachenko and M. R. Dixon. These results were summarized in a monograph on infinite dimensional linear groups, written in collaboration with L. A. Kurdachenko and M. Dixon, which comes out this Spring at the CRC (Taylor and Francis) publishing house.

The collaboration with M. Dixon and L. Kurdachenko turned out to be very productive. Thus, the following textbooks were published: M. R. Dixon, L. A. Kurdachenko, I. Ya. Subbotin, *Ranks of Groups: The Tools, Characteristics, and Restrictions*, John Wiley & Sons, Hoboken, New Jersey, 2017; M. R. Dixon, L. A. Kurdachenko, I. Ya. Subbotin, *An Introduction to Essential Algebraic Structures*, John Wiley & Sons, Hoboken, New Jersey, 2014; M. R. Dixon, L. A. Kurdachenko, I. Ya. Subbotin, *Algebra and Number Theory: An Integrated Approach*, John Wiley & Sons, Hoboken, New Jersey, 2010.

Recently I. Subbotin's research interests turned to infinite dimensional Leibniz Algebras. The main goal is to build a theory which is parallel to

the theory of infinite groups. New results in this area were published in a few journal articles and surveys.

Together with his collaborators, N. N. Bilotskii, L. A. Kurdachenko, S. S. Levischenko, M. S. Yakir, M. Hill, H. Badkobehi, F. Mossavar-Rahmani, P. P. Baryshovets, P. Serdyukov, N. Serdyukova, C. Griener and others, I. Subbotin actively participated in the development of Iterative Instructional Model, studied applications of Fuzzy Logic to assessment process, conducted researches on theoretical basis of some important topics of high school and college mathematics. Interest to Fuzzy Logic led I. Ya. Subbotin into the theory of fuzzy groups and fuzzy rings. Together with L. A. Kurdachenko and others he implemented some new approaches in the theory of fuzzy groups. His results on fuzzy groups were published in two works written jointly with L. A. Kurdachenko and V. S. Yaschuk, where the theory of fuzzy groups and fuzzy rings was “translated” from a functional language into the language of ordinary algebraic structures.

I. Subbotin’s research in algebra was supported by many international grants, including 2010-2013 Grant supported by Dirección General de Investigación of MICINN (Spain), the Department of Science and Technology of the Government of Aragón (Spain), FEDER funds from European Union, and 1996 Volkswagenstiftung research grant. He received the National University Distinguished Researcher Awards four times.

Of course, all that is a very short and general description of I. Subbotin’s research achievements, and we were not able to mention many of his important results in this brief article.

I. Ya. Subbotin is one of the first instructors who began teaching mathematics on-line. He successfully developed and taught some general mathematics courses via newly developed Precision Learning format.

In 2013 he was awarded the National University Distinguished Teaching Award.

I. Ya. Subbotin is a very energetic and enthusiastic mathematician and mathematics educator with more achievements to come.

He is a caring and loving husband, father and grandfather.

We warmly congratulate him on his 70th birthday and wish him good health and many successful years of research and teaching.

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