AT THE ORIGINS OF THE FOUNDATION OF I.VEKUA INSTITUTE OF APPLIED MATHEMATICS PROF. SHALVA PKHAKADZE - 100

George Jaiani, Khimuri Rukhaia

I. Vekua Institute of Applied Mathematics
I. Javakhishvili Tbilisi State University
University str. 2, 0186 Tbilisi, Georgia.
george.jaiani@gmail.com

The Institute of Applied Mathematics of I.Javakhishvili Tbilisi State University was founded in 1968. Last autumn the jubilee to mark the 50th anniversary of the Institute was widely celebrated at the University. At first there were 10 departments at the Institute. Among them was the department of Mathematical Logic and Algorithms. It was headed by the doctor of phys.-math. sciences, Prof. Sh. Pkhakadze.

To the centenary of his birthday was dedicated the one day scientific session at the Institute as well as the section of applied logic and programming at the XXXIII International enlarged session. On September 09-15, 2019, at the Technical University the Tbilisi International summer school "logic, language, artificial intelligence", dedicated to the same event, was held.

Shalva S. Pkhakadze was born on April 7, 1919, in the village of Upper Sakara (Zestafoni district). He successfully finished the Upper Sakara primary school (1930) and later Zestafoni secondary school (1933) and Zestafoni pedagogical school (1936) and finally the physics and mathematics faculty of Tbilisi State University (1941).

He defended his graduate thesis "On the geometrical theory of differential equations" under the supervision of Acad. Giorgi Chogoshvili. In 1942-1952 Shalva Pkhakadze worked as a teacher in different schools of the Zestafoni district. At the same time, in 1944-49 he was a methodist of the educational department of the Zestafoni district and was head of the mathematical section of the above department.

In 1949 Shalva Pkhakadze began to study the theory of integrals and the set theory under the supervision of the Corresponding Member of the Academy Vladimer Chelidze and a year later he started his studies in the measure theory.

In 1952 he read his lecture at the seminar of the functions theory department of A. Razmadze mathematical institute, thus announcing the main

results of his investigations. At the same time the new problems were set
forth, concerning the theory of Lebesgue type measures. Taking V. Che-
lidze's advice, Sh. Pkhadze decided to present part of his works, namely, the
one, in which he deals with the question of validity of The Fubini Theorem,
concerning the change of integration order in double integrals as a disser-
tation thesis. After delivering the above paper, he was invited to work
at the A. Razmadze mathematical institute as a junior research worker
(1952) where he finished his candidate's thesis and defended it successfully
in 1953. The same year he made several reports at the seminar of Academi-
cian P.S. Novikov in Moscow (V.M. Steklov Mathematical Institute) where
he formulated the problems, posed by him and presented his own results.
The positive evaluation of his works on the side of P.S. Novikov and the
members of the seminar was a powerful incentive for him to go on with his
fruitful scientific studies. Since 1953 Shalva Pkhakadze has been the senior
research worker of the A. Razmadze mathematical Institute.

In 1959 he successfully defended his doctoral thesis "On the theory of
Lebesgue type measures" and in January, 1965 was granted the title of
professor. During this period Shalva Pkhakadze got important results in
the general set theory and namely, in the theory of measure. Since as a
result of development of mathematics and theory of automata the need for
specialists, working in the field of mathematical logic increased in the 60ies
of the last century, Shalva Pkhakadze did his best to found and promote
the theory of mathematical logic in Georgia.

Since 1966 he had been reading general and special courses of lectures in
mathematical logic at the physics and mathematics department of the Uni-
versity. At the Institute of Applied Mathematics of Tbilisi State University
Sh. Pkhakadze, with the help of Acad. Ilia Vekua, founded (for the first time
in Georgia) the department of mathematical logic and theory of algorithms
which was staffed mainly by his own students. At the same time Shalva
Pkhadaze began developing a new original direction in mathematical logic
where his pupils – O. Chankvetadze, Kh. Rukhaia, V. Pkhakadze, Z. Khasi-
dashvili were involved. Besides, in the department of mathematical logic
and theory of algorithms investigations were carried out in the proof theory
(M. Rogava, O. Tskhadadze), in the theory of algorithms (R. Omanadze,
M. Tetruashvili), theory of automata and automated proof (N. Kalan-
darishvili, K. Pkhakadze), theory of measure and sets (A. Kharazishvili,
A. Kipiani).

The basic results, obtained in this direction, are given in Sh. Pkhakadze's
monograph "some problems of the notation theory". This work is of great
theoretical and practical significance and in fact, creates the theory of con-
tracting symbols which had existed only as a part of the definition theory
before. In the monograph the rational system is found which introduces

contracting symbols, terminology is worked out and basic theorems on the main properties of contracting symbols and contracted forms are proved. On the basis of the actual problems, set by him, his pupils are involved in developing the theory of contacting symbols even today (Kh. Rukhaia, K. Pkhakadze, L. Tibua).

The results of Shalva Pkhadze and his pupils arose great interest not only among theoreticians but among specialists, working in applied fields of mathematics. For example, in 1979 the agreement was signed between the I. Vekua Institute of Applied Mathematics and the Department of digital automata of the Institute of Cybernetics at the Ukrainian Academy of Science. It provided cooperation between the members of the mathematical logic and algorithm theory of the Institute of Applied Mathematics and department of digital automata at the Ukrainian Institute of Cybernetics. The results, given in the above monograph and those, obtained by his pupils at the same period of time, were mentioned at the All-Union conference "Artificial intelligence and automatization of mathematical investigations" (Kiev) and in 1979 at the conference, dedicated to Gottlob Frege (Jena). The interest after these reports was great and as a result close contacts were established between the local group of logicians and group of mathematicians from Irkutsk, headed by Acad. V. Matrosov. The significance of a certain direction in logic is testified by means of Sh. Pkhakadze's monograph in the doctoral thesis of F. Van Ramsdok (Amsterdam, 1966) where Pkhakadze's theory of contracting symbols together with the work of the famous mathematician P. Axel is evaluated as the primary source in term rewriting for the case of connected variables.

Shalva Pkhakadze's critical report about Church's thesis arose special interest at the VI All-union conference of logicians (1983). The results, obtained along these lines, are mainly contained in his scientific work "An intuitively computable, everywhere defined function and Church's thesis" (Tbilisi University Press, 1984). In it he considers a very principal and important issue of the validity of Church's famous thesis.

Besides intensive scientific activities he led an active pedagogical life. For more than 10 years he worked at the Tbilisi Polytechnical Institute as Professor at the Chair of higher mathematics (1962-1972). Since 1962 he had been teaching at the Tbilisi State University. His activities as a scientist and a teacher were especially effective during his work at the Institute of Applied Mathematics of TSU, since the main goal of the initiator of founding this institute, I. Vekua was to create the base for the joint research work of scientists, teachers, postgraduates, candidates and students. At the Institute Sh. Pkhakadze was a supervisor of post graduate students and candidates. Among his students are 2 doctors of science (Acad. A. Kharazishvili and R. Omanadze) and 6 candidates of science

(M. Tetruashvili, Kh. Rukhaia, G. Kobzev, Z. Khasidashvili (working now in Israel), O. Chankvetadze and T. Kutsia (now in Austria). The students of mechanics and mathematics faculty of the University at all three stages are using his manuals and textbooks even today.

Sh. Pkhakadze took an active part in the social life of the country. He had been member of different scientific councils, specialized councils among them, granting doctor's and candidate's degrees. He was a member of the problematic council of mathematics and mechanics in Georgia, namely, chairman of the section of mathematical logic at this council and member of the methodology section. He was also a member of the education overseers council at V.M. Komarov mathematical school.

For his long and fruitful scientific and pedagogical activities Shalva Pkhakadze was granted the title of the honoured scientist and in 1979 at his 60th birthday jubilee – I. Javakhishvili medal.

Shalva Pkhakadze passed away on August 8, 1994 (Buried at the Saburtalo pantheon), but his ideas and activities which he started at the I. Vekua Institute of Applied Mathematics, are still going on successfully for the benefit of our country and on the centenary of his birth we are paying tribute to his memory.

Sitting (from left to right): Boris Khvdelidze, Elene Obolashvili, Ilia Vekua, Revaz Kordzadze, Tedore Tskhadaia, Gvanji Mania. Standing (from left to right): Guram Kharatishvili, Vakhtang Zhgenti, Amiran Getia, Alexander Khvolesi, Shalva Pkhakadze, Tengiz Gegelia. - Institute of Applied Mathematics, 1968.