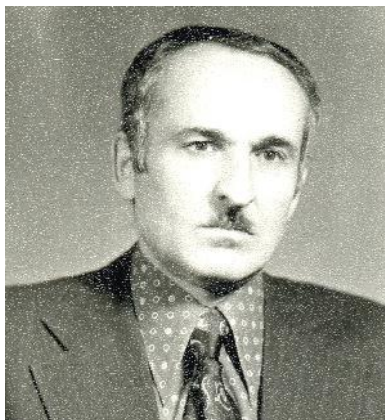


Levan Zhizhiashvili: a scientist and a teacher

Levan Zhizhiashvili was born in a mountainous village Khorkhi, Dusheti Region, Georgia. He was born in to the family where education was greatly praised. It seems that



L. Zhizhiashvili's achievements were revelation of his childhood dreams.

In 1951 Levan Zhizhiashvili successfully finished Dusheti secondary school. The same year he entered Tbilisi State University, Faculty of Mechanics and Mathematics, from which he graduated with honours in 1959.

Levan Zhizhiashvili became interested in problems, connected with multiple Fourier trigonometric series during his lifetime at the university. In this period, particularly in 1959, Antony Zygmund's fundamental book "Trigonometric Series" was published. In the book besides highly developed one-dimensional theory there was also discussed a new direction: theory of multiple Fourier series. A. Zygmund points out in the preface that: "The field is vast and promising and at present we probably do not realize the shape of its problems, though the results here may be even more important for applications than in the case of a single variable".

Generally speaking, the 50-60-ies of the last century were very productive for multidimensional harmonic analysis. In particular, the following new branches were created in that period:

- the theory of singular integrals (by A. Calderon and A. Zygmund)
- the theory of several variable Fourier transformation and harmonic functions (by E. Stein, G. Weiss and others)
- the theory of differentiable functions of several variables (by E. Stein, S. Nikolskii, O. Besov, and others)

Levan Zhizhiashvili greatly contributed to the development of classical aspects of multidimensional harmonic analysis, namely to the investigation of convergence and summability problems of multiple Fourier series and their conjugates and metrical properties of multidimensional conjugation operator. While being a post-graduate student he obtained very interesting results which became the basis of his Candidate dissertation, defended in 1961 at Tbilisi A. Razmadze Institute of Mathematics under the supervision of the founder of Georgian function theory school Vladimir Chelidze (Vladimir Chelidze is well-known as one of the creators of Danjoi integral multidimensional theory).

The young researcher continued working intensively and willingly on the definite field:

- a monograph based on the series of works was published in 1964;
- in 1965-1967 Levan Zhizhiashvili is an active participant of Piotr Ulyanov and Dmitry Menshov's famous scientific seminar at Moscow University;
- in 1967 Levan Zhizhiashvili received a doctoral degree at Moscow University.

The dissertation was admitted to be a significant research in the development of multidimensional Fourier analysis. Later, during his lifetime Levan Zhizhiashvili never stopped hard and creative scientific work which are proved by:

- more than 80 scientific articles
- two extended survey articles on the problems of multidimensional Fourier analysis, published in the journal "Russian Mathematical Surveys" and the book of the same kind: "On some questions of multidimensional harmonic analysis" (Tbilisi, three editions: 1981, 1996, 2004)
- monograph "Trigonometric Fourier series and their conjugates", Kluwer, 1996

The last monograph summarizes Levan Zhizhiashvili's rich scientific inheritance. Within the fundamental results and methods the work is topical on account of raised problems the solution of which is important for the further development of a certain field. This book will remain as one of the main sources of research for mathematicians interested in the study of

multiple Fourier series.

The most outstanding achievements of Levan Zhizhiashvili are connected with the perfect solution of the following three problems: problem on the existence of multivariable conjugate function; the one on the convergence of Chezaro and Abel- Poisson means of conjugate multiple Fourier trigonometric series; and the other on the convergence of Marcinkiewich means of double Fourier trigonometric series. Namely, by Zhizhiashvili it was established that:

- $L(\ln^+ L)^{k-1}([- ,]^n)$ is the best integral class in which the existence of the conjugate function taken with respect to some k among n variables is guaranteed. This result gave an answer to the problems posed by A. Zygmund and P. Ulyanov;
- $L(\ln^+ L)^{n-1}([- ,]^n)$ is the best integral class in which the convergence in measure of Chezaro means of positive order and of Abel-Poisson means of conjugate multiple Fourier trigonometric series is guaranteed. This result was the answer to the problems posed by D. Menshov;
- For arbitrary summable function f on two-dimensional torus its Marsinkiewich means converges to f almost everywhere. This result gave an effective solution of the classical spectral syntheses problem in the two-dimensional case.

Besides the abovementioned results in Levan Zhizhiashvili's works there are found optimal conditions implying convergence in various senses (such as pointwise, almost everywhere, norm) of multiple Fourier series and their conjugates. In the cycle of works approximative properties of the mentioned series in terms of modules of continuity are thoroughly investigated.

Levan Zhizhiashvili had close and friendly relations with many famous foreign mathematicians like Piotr Ulyanov, Boris Golubov, Valentin Skvortsov, Konstantin Oskolkov, Alexander Talalian, Laslo Laindler, Alexander Stepanets, Shavkat Alimov and others.

Levan Zhizhiashvili is remembered as a great teacher and organizer: since 1968 he worked as a professor of Tbilisi State University; since 1978 he was the head of the Chair of Function Theory and Functional analysis; during several years he was the Chief of the Dissertation Board of Algebra, Topology and Function Theory; in 1969-1977 he was the Dean of the Faculty of Mechanics and Mathematics.

Up to 30 candidate and 12 doctoral dissertations were defended under the supervision of Levan Zhizhiashvili. This result is caused not only by the supervisor's high qualification and the broad field of interests but by personal features of the scientist as well. On the one hand, Levan Zhizhiashvili had a gift to cast talented and hardworking young people and on the other hand, he had a skill to motivate and inspire them. Moreover, young researchers were surrounded by parental care and responsibility from the great scientist.

For his great scientific and pedagogical achievements in 1974 Levan Zhizhiashvili was elected a corresponding member of the Georgian Academy of Sciences and later in 1993 its real member.

Levan Zhizhiashvili was a faithful believer and a patriot of his country, Georgia. He was born in the magnificent part of Georgia where the genius poet and writer Vazha Pshavela was from, whose photo he had hung over the seminar board in his study. He believed that any kind of knowledge should be synthesized with the high morality. Levan Zhizhiashvili's life like Vazha Pshavela's characters was full of uncompromised searches for the truth, devoted love for the country and a human being.

Ushangi Goginava