

**ANATOLY KILBAS's 60th BIRTHDAY:
CONGRATULATION**

Stefan Samko

This is my big pleasure to write congratulation words for my good friend, colleague and coauthor, a member of our "FCAA" Editorial Board, Anatoly Aleksandrovich Kilbas. He celebrates his 60 years jubilee on July 20th, 2008. Being old friends indeed, we seem to have also another jubilee this year, 35 years of our friendship and collaboration.

Anatoly Kilbas was born in Minsk, in Belarusian family. I was happy to be familiar with his parents, his mother the late Tatyana Makarovna, a very delicate woman and the heart of their big family, and the father Alexandr Antonovich, a strong man, well known in the "previous life" in the former Soviet Union, from whom it was always interesting to learn many stories both from his active life and also stories from his hunting, he was a big amateur of hunting.

To his jubilee, Anatoly Kilbas, Head of the Chair of Function Theory at the Department of Mechanics and Mathematics of Belarusian State University, Minsk, came as a renowned expert in fractional calculus, integral equations and special functions.

Anatoly Kilbas entered Belarusian State University in 1966 and ended Master courses there in 1971. In 1973-1976 he continued his education in Post Graduate Studies (known as "aspirantura" in the Soviet system of education) and defended his first scientific degree, called in the Soviet Union as "Candidate of Physical and Mathematical Sciences", nowadays acknowledged as an equivalent of PhD, on June 22 of 1976. His PhD thesis was titled: *"Operators of Potential Type With Power-Logarithmic Kernels and Integral Equations Solved in Closed Form"*, under the supervisorship of Academician of Belarusian Academy of Sciences, Professor Fedor Dmitrievich Gakhov, famous among experts in boundary value problems and singular integral equations by the solution of the Riemann boundary value problem he gave in 1937.

Anatoly defended his Second Thesis "*Fractional Integration Operators. Asymptotic and Composition Properties and Applications*" for the degree of Doctor of Sciences on October 25 of 1995, and took a position of a Full Professor at the Faculty of Mathematics and Mechanics of the same university in July of 1996. After 2002 he is the Head of Chair of Theory of Functions.

This is just a short enumeration of the official part of his CV.

The main scientific interests of Anatoly Kilbas are in Fractional Calculus, both of one and many variables. Yet in his first papers he generalized a certain fractional type integral equation considered in the known book of S.G. Mikhlin on integral equations, to the case of many variables, this generalization being known as the "pyramidal equation". To many experts in this field his name is known by the book:

S. Samko, A.A. Kilbas and O.I. Marichev, *Fractional Integrals and Derivatives. Theory and Applications*. Gordon & Breach Sci. Publishers, 1993.

In the last decade his interests in this area were mainly concentrated around the fractional differential equations, which were in particular shaped in the book:

A. Kilbas, H. Srivastava and J. Trujillo, *Theory and Applications of Fractional Differential Equations*. Elsevier, 2006.

Another field of his interests is in the area of special functions and integral transforms, reflected in another his book:

A. Kilbas and M. Saigo, *H-Transforms: Theory and Applications*. CRC Press, Ser. Analytical Methods and Special Functions, 2004.

Anatoly is a very active, vivid and friendly person. Everything he is doing in his life - working, writing papers or books, or having a rest, playing football - he is doing with pleasure and taste for life. He is liked by people and he has many friends and colleagues-collaborators. Having known Anatoly very close for many years, I saw him angry and discontented probably twice for more than thirty years (and certainly there were reasons for that).

He travels a lot as a visiting professor and/or a colleague invited for joint work. He is often invited for invited talks at conferences. The set of points of his visits seems to be rather dense on the earth: Steklov Institute (Moscow, Russia), Rutgers University (New Brunswick, USA), Dalian University of Technology (Dalian, China), Freie Universitat Berlin (Berlin, Germany), Fukuoka University (Fukuoka, Japan), Friedrich-Schiller Jena University (Jena, Germany), Czesz Academy of Sciences (Prague, Czech

Republic), University of La Laguna (La Laguna, Spain), University of Algarve (Faro, Portugal), Instituto Superior Técnico (Lisbon, Portugal), Bologna University (Bologna, Italy), Padova University (Padova, Italy), Aachen Technical University (Aachen, Germany), Yonsei University (Seoul, Korea), Università de Roma La Sapienza (Rome, Italy), Vilnius Institute of Mathematics and Informatics (Vilnius, Lithuania), Wolfram Research Inc., (Champaign, Illinois, USA), Centre for Mathematical Sciences (Pala, India).

Professor Kilbas is a head of scientific school in Belarus in fractional calculus and integral transforms. Among his former students there are 14 PhD who defended their theses under his supervisorship: I.N. Zabello (1985), S.I. Vasilets (1990), A.P. Grinko (1991), S. Bubakar (1992), Din Khoang An (1993), S.A. Shlapakov (1994), S.V. Demianko (2002), L.V. Yarot-skaya (2003), E.V. Gromak (2004), E.K. Schetnikov (2004), S.A. Marzan (2005), A.A. Koroleva (2006), A.A. Voroshilov (2006), A.A. Titiura (2007).

Anatoly Kilbas is also known as one of the organizers of the *AMADE conferences in Belarus*, which became internationally popular last years.

An actively working mathematician, Anatoly Kilbas is also a sportive person. He likes to play football and plays whenever there is an opportunity for that. At many conferences, where there is a possibility, he plays either for the team of Belarus, or for the team of Mathematical Analysis, or for some other team. In general, he is a big amateur of football, and always impressed his friends by remembering all the important World and European games, including who kicked the ball into the goal and at what minute of the game. He is a good chess player and yet in 1968 he gained a rather high position in official chess ranking. By advice of his supervisor Academician F.D. Gakhov, he chose mathematics instead of chess. As he told to me many times, he never regretted about this choice. Nevertheless, he continues to play chess at various levels, in particular in the chess team of Math. Department of his university.

Anatoly is happy in his family, with his wife Tamara. He has two daughters Aleksandra and Tatyana, a son Andrei and a charming grandson Vladimir.

Active and very enthusiastic in everything, he is doing in mathematics, he always keeps a keen interest to new ideas and new trends in fractional calculus, integral transforms and special functions.

He is in a good shape, both mathematically and physically. I wish him to keep this shape for many decades ahead!

**PERSONAL LIFE OF A SCIENTIST:
TO 60th BIRTHDAY OF PROFESSOR ANATOLY KILBAS**

Sergey Rogosin

Abstract

This paper is devoted to 60th birthday of the well-known mathematician, Professor Anatoly Alexandrovich KILBAS. Different aspects of his scientific career are described here.

1. Prehistory

Anatoly Alexandrovich Kilbas was born on July 20th, 1948, in Minsk, Belarus. As a schoolboy he had a lot of interests in different subjects. Later, he remembered the name of his first teacher in mathematics, who has shown him the beauty of this discipline and discerned a prospective mathematicians in a very active boy. At that time competitions on different school disciplines were very popular in the Soviet Union. Anatoly successfully took part in regional and republican competitions on mathematics. It helped him to develop a sharp and straightforward way of thinking. One more thing was important for creating of his character. It was with him at that time as well as during all his life. He is fond of sport, playing up to now football, volleyball, chess...

In 1966 he has finished a secondary school in Borisov, Minsk region, and entered at the same year the mathematical faculty of the Belarusian State University in Minsk.

2. Beginning

He studied at the mathematical faculty of the Belarusian State University from 1966 till 1971. Moreover, all his academic and research career is developing at this university. He has left Belarusian State University for a long period only 3 time (for scholarship in USA, at Rutgers university, October 1984 - July 1985; in China, at Dalian university of technology, September 1989 - February 1990; in Japan, at Fukuoka university, October 1994 - January 1994).

At the mathematical faculty of the Belarusian State University he found himself in a very strong group of students, having a good background for further study and good ability for it. Many of his group mates became known mathematicians, working either in Belarus or abroad. The first years of study in conditions of high competition were very difficult but extremely interesting. Such conditions helped him to graduate from the mathematical faculty of Belarusian State University in Top 5.

It should be said few words about the Belarusian mathematics of that time. After the World War, Belarus started a new life from real ruins. The Belarusian mathematics was also constructed practically from zero level. A number of known mathematicians arrived to Minsk and created groups of young students and aspirants which can help them to make a new impact for further development. Among them were N.P. Erugin, E.A. Barbashin, Yu.S. Bogdanov, F.D. Gakhov, I.A. Prusov, D.A. Suprunenko. They gave good lectures and attracted students to start their own research.

When the problem of a choice of the subject has stayed behind A. Kilbas, he decided to choose mathematical analysis, joining a group of Fedor Dmitrievich Gakhov. Academician F.D. Gakhov (1906-1980) was very active and prominent mathematician. But the most important his feature was the organizing abilities. In his life he had created three known schools on boundary value problems and singular integral equations, namely in Rostov-on-Don, Kazan and Minsk. Besides, he was a very good teacher and scientific adviser. 52 of his post-graduate students had defended their PhD theses.

A. Kilbas has started to work in this group attacking the problem of closed form solution to certain integral equations with weak singularities. It was rather successful and created a good background for his further growth in mathematics. After his graduation from the mathematical faculty he was invited to work at the chair of mathematical analysis at this faculty, first at the research position. His career went through all possible positions at

this chair, up to the position of the head of the chair he had occupied since 2002.

Speaking about his beginning in Mathematics, Anatoly always says that a great part of his further success in mathematics is due to Fedor Dmitrievich Gakhov. He remembers his Teacher and tries to pay attention for preserving the memory and respect to this great man.

3. Research

In the first period of his research career he has investigated solvability and constructed closed form solution to integral equations with weak singularities and special functions in the kernels.

In 1980th a new research area has attracted him. Together with his colleagues, S.G. Samko and O.I. Marichev, as well as with young mathematicians he started to gather information and to develop the theory of fractional integro-differentiation. The first but very essential result was the publication in 1987 of the monograph [B1], an extended version of which was published later in English [B2]. Nowadays there are several books on fractional integrals and derivatives and this subject becomes one of the most developing in modern mathematics, but in the middle of 1980th an appearance of the book [B1] was really breakthrough in analysis.

A.A. Kilbas is developing the theory of the fractional calculus. His method is based on the asymptotic analysis, composition and analytic properties of operators. In this direction he has created the second degree thesis, defended by him in 1995. He continues this research up to now, paying attention not only to the theory, but also to applications in other branches of mathematics (such as differential equation with fractional derivatives), as well as in description of certain phenomena in physics, mechanics, chemistry, biology etc. (see [B3], [B6]).

In his further work he has turned a little bit in the direction of the study of properties of new classes of special functions and corresponding integral transforms. In part, it is connected with his early research on integral equations of the first kind, for which the method of integral transforms is one of the basic methods. Besides such a study is related to fractional calculus too. At last, it helped him to work in completing the theory of one of the general transform, so called H -transform, which includes many of known integral transforms. A realization of this program is presented in one of his recent monograph [B4] prepared together with his Japanese colleague M. Saigo.

He is working actively in many directions related to development of mathematics. A. Kilbas is a member of Editorial Boards of the mathematical journals “Integral Transforms and Special Functions” (since 1997), “Fractional Calculus and Applied Analysis” (since 1998), “Trudy Inst. Math. Minsk” (since 2004), “Vestnik of Belarusian State University. Ser. 1” (since 2004), and “Advances in Applied Mathematical Analysis” (since 2006). In 2005 he became a member of the scientific board of “International Society for Analysis, Applications and Computations” (ISAAC).

He was one of the main organizers (vice-chairman) of five successful international conferences held in Minsk, Belarus (“Boundary Value Problems, Special Functions and Fractional Calculus”, 16-20.02.1996), and “Analytic Methods of Analysis and Differential Equations”, 14-19.09.1999, 15-19.02.2001, 4-9.09.2003, 13-19.09.2006). The first, third and fifth of these conferences were dedicated to the 90th, 95th and 100th birthday of his Teacher, academician F.D. Gakhov. Together with his colleagues he has edited the proceedings of all these conferences (see [BE1–12]).

He was a member of organizing committee of important mathematical conferences, including the VIII, IX and X Belarusian Mathematical Conferences, “Fractional Calculus and its Applications” (Bordeaux, France, 19–21.07.2004), 5th ISAAC Congress (Catania, Italy, 25–30.07.2005), 6th ISAAC Congress (Ankara, Turkey, 13–18.07.2007), and delivered invited lectures on many other conferences all over the world.

14 of his post-graduate students have successfully defended their Phd Theses, namely: I.N. Zabello (1985), S.I. Vasilets (1990), A.P. Grin’ko (1992), Silla Bubakar (1992), Din Khoang An (1993), S.A. Shlapakov (1994), S.V. Dem’yanko (2002), L.D. Yarotskaya (2003), E.V. Gromak (2004), E.K. Schetnikov (2004), S.A. Marzan (2005), A.A. Koroleva (2006), A.A. Voroshilov (2006), A.A. Titoura (2007).

4. Few words about features

Anatoly likes and can be a friend. Friendship with many of his school and university mates, colleagues, members of some sport units, is one of the main priorities in his life. May be, his attitude to his friends is a little bit more romantic than people say to have it in our hard world, but it is really sincere. He is often traveling abroad. It seems that at every country he finds friends. The list of these countries coincide with the list of his trips. The most closest friends of him are those whom he has met in his youth, but there are some exclusions. One of them is a very close relation with

academician Sergei Mikhailovich Nikol'skii. Despite of the great respect to this brilliant man, Anatoly could always find something (words, subject for conversation, etc.) which is really interesting for both of them.

All his life he tried to be in good relation with most people around. The most characteristic in this sense was a period when he defended his second degree thesis in 1995. No word against it was said by no one (as before the defence procedure, as during it, as many years later), not only in public, but behind too.

Anatoly has extremely good memory. He remembers each of his researcher papers and could say in which section of his (joint with S.G. Samko and O.I. Marichev) fundamental monograph on Fractional Calculus everybody can find one or another mathematical result. More of it, as a chess player he knows all World Champions in Chess, as well as some of their parties. If you need to know some recent sport results (in football, hockey, even in sumo) you can ask him. Anatoly can declaim the poetry of many of his favorite poets. From time to time he compiles verses by himself.

He is the life and soul of the party practically everywhere. At any conference he surely sings at least one Belarusian song.

His care about the old parents is one of the great examples of son's love. It was a big tragedy for him when his mother passed away some years ago. He can always speak about the most important person in his modern life, his grandson Vova. The recent photos of him are always in the bag of Prof. Kilbas.

5. A plan for the next 60 years

The title of the article is "Personal life of a scientist". As a real scientist, Anatoly Kilbas is full of plans in research, in publishing books, in new scientific projects. To provide all these plans another person has to have several lives, but not he. People say, "he is a lucky man because he is a sportsman." In part it is true. He could do many things because of his activity.

One of our colleagues has proposed to introduce new unit

$$\text{"K I L (o) B A S"}$$

with transliteration "Kilo basic activity of scientist", meaning that not too many people can achieve $\text{K I L (o) B A S} \equiv 1000 \text{ B A S}$, but A.A. Kilbas can.

Anatoly Kilbas likes to work in group. He has published a lot of papers and books with many colleagues all over the World. May be it is not good to cite all their names but the geography is very attractive: Belarus, Canada, India, Italy, Germany, Portugal, Russia, Spain, USA, Japan. All of his colleagues and friends wish him to preserve all his features, to attend many new results and to be always at the level 1 K I L (o) B A S.

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