

IN MEMORY OF ROSTISLAV V. BELYAEV

PACS: 01.60.+q

DOI: 10.17725/rensit.2023.15.199



On April 19, 2023, at the age of 89, Rostislav Vladimirovich Belyaev, Candidate of Physical and Mathematical Sciences, Senior Researcher at the Laboratory of Physical Fundamentals of Nanocomposite Materials for Information Technology, Department of the Physical Fundamentals of Nanoelectronics, Kotelnikov Institute of Radio Engineering and Electronics of the Academy of Sciences of the Russian Federation, Corresponding Member of the Russian Academy of Natural Sciences, a well-known specialist in the field of generation of microwave noise oscillations and processing of broadband signals based on dynamic chaos.

Rostislav Vladimirovich was born in 1934 in the city of Astrakhan. His father, VI Belyaev, a surgeon, graduated from Astrakhan Medical Institute. He died in 1939 at age 30 from an incurable disease. Paternal grandfather - IA Belyaev was born in 1885 in the Kaluga province, graduated in 1914, the Medical Faculty of the University of Emperor Nicholas in Saratov. Was called up for military service, was awarded the Order of St. Stanislaus 2 and 3rd degree, the Order of St. Anne 3rd degree. Since 1915, worked at the Department of Ophthalmology of the Imperial University of Nicholas, from 1923 to 1933. headed the Eye Clinic of Astrakhan Medical Institute at the rank of professor, from 1933 to 1944. headed the Department of Ophthalmology at Saratov State Medical Institute. Mom graduated from Astrakhan Medical Institute and worked all her life pediatrician. Her parents were military, but by her husband mother - entrepreneurs.

After graduating in 1952, high school, RV Belyaev enters the Moscow Institute of Physics and Technology in the 1st specialty - Electronics (faculties then MIPT not yet exist). In the process of learning takes place in the MIPT basic practice and training on leading electronics industry of the USSR Research Institute "Istok" Fryazino Moscow region. Thesis at the end of training devoted to the study of field emission properties of rare-earth elements, under the supervision of Ph.D. BS Kulvaskoy performs in the newly established in Moscow on the initiative of academician AI Berg Institute of Radio Engineering and Electronics, Academy of Sciences of the USSR (1953, in the building of the Faculty of Physics, Moscow State University, migrated to the Lenin Hills).

After graduation RV Belyaev in 1958 distributed in IRE USSR Academy of Sciences for the post of junior researcher, where the Department of Electronics, headed by Corresponding Member of the USSR Academy of Sciences DV Zernov, engaged in the development and study of electron-beam systems with flat beam for automatic coding signals. In 1971, during the reorganization of the structure of RV Belyaev transferred to the laboratory headed by VYa Kislov, and thus changes the direction of the work performed.

The main themes of future activities RV Belyaev associated with developing area generating chaotic oscillations with a level greater than the noise floor systems, that is due to the properties of nonlinearity and delay effects, implemented in particular in systems with feedback delay feedback:

- research and development in the field of microwave generation broadband noise oscillations in plasma;
- research and the creation of electron-wave microwave devices;
- research and creation of a noise signal generator of the microwave range on the basis of solid state semiconductor devices.

Further, due to the transition from analog to digital, RV Belyaev conducted research algorithms of pseudo-numeric (integer) sequences and their properties:

- development of digital broadband information technologies based on dynamic chaos for processing, transmission, storage and protection of information;
- development and application of research methods of fractal analysis of complex wideband signals.

The thesis is an RV Belyaev the title of Ph.D., completed in 1986, is devoted to the study of excitation noise oscillations in generators on the avalanche-transit diodes (ATDG). It is known that these oscillators are excited into oscillation, which together with the spectrum of the harmonic components comprises a continuous component with a level exceeding the feedback fluctuations of the avalanche current. In some cases, increasing operating current ATDG leads to the excitation of noise fluctuations without isolation of the harmonic components. Studies on simple models of self-oscillating systems such as the Van der Pol has shown that under certain conditions, even in such systems can be implemented modes of the complex nature of the oscillations. In order to identify the nature of the excitation of anomalous noise regulations in ATDG experimentally investigated such generators on simple systems that allow a controlled excite one-, two- and three-mode oscillation. It is shown that in these systems when the current ATDG modes implemented with the spectra vary according to the complexity of sequential scenarios generated oscillations typical for a large class of dynamical systems studied simple models. These results demonstrate the dynamic nature of the excitation of abnormal noise oscillations in such generators, although fluctuations of the avalanche current in such generators will undoubtedly affect the level of their appearance, but they are not the direct cause of the chaos, it is - in the complex dynamics of the diode-oscillating circuit. These results have practical application in the creation of practical systems generating wideband noise signals ATDG based on a power level comparable to the level of the oscillation generating ordered.

RV Belyaev, together with Institute staff developed, implemented and studied in the form of digital circuits forming algorithms broadband noise signal, which have found practical application in real-world applications.

Together with other members of the Institute, he repeatedly took part in field work and trials in various parts of the country from Kamchatka to Astrakhan, from Voronezh to Sevastopol.

Since 1958 to the present time Rostislav Belyaev - employee IRE RAS, from 1971 to 1986. - Junior Researcher, from 1989 to present - Senior Researcher, from 2007 to 2010. Acting Head of laboratory.

The scientific results RV Belyaev published in 65 articles in various journals and presented at 42 national and international conferences. Has 4 inventor's certificates.

RV Belyaev - conferee of several international and national conferences, schools systems with chaotic oscillations. Is responsible executor of the decree of the government, as well as on numerous grants RFBR and ISTC. Rostislav Vladimirovich - member Russian Scientific and Technical Society of Popov Radio Engineering, Electronics and Communication since its inception in 1991, corresponding member of the Russian Academy of Natural Sciences (2001) in the Department of Radio Electronics problems, nanoscale physics and information technology.

RV Belyaev since 2009 - Executive Secretary of scientific journal "RadioElectronics. Nanosystems. Information Technology" (RENSIT).

In 1997 he was awarded the honorary title of Veteran of Labor; he was awarded the medal "In commemoration of the 850th anniversary of Moscow", the badge "Honorary Radio Operator" the Ministry of Radio of Russian Federation.

Rostislav Vladimirovich - a tireless traveler and experienced water tourists, traveled the country and outcome of Far North - Kola Peninsula, Ural Mountains, Putoran, Kamchatka, tributaries of Pechora, Ob, Yenisei (Lower and Stony Tunguska), Lena, to the South - Lake Baikal, Issyk Kul, Tuva - the origins of the Yenisei region near border with Mongolia. Herewith he is actively promoting this lifestyle among employees, pulling them into their dizzying projects.

Life Rostislav Vladimirovich - a living history IRE, he - where need heavier laborious work, creating soil in which grew all important results of collective. Its reliability, natural intelligence, politeness, courtesy, responsiveness, high scientific erudition, amazing performance, devotion to work, integrity and responsibility - priceless gift to the his collaborators.

Rostislav Vladimirovich Belyaev was a very kind and warm, extremely decent and wise man, possessing at the same time strength and firm conviction in his research. A bright and eternal memory of him will remain in our hearts.

**Relatives, friends, colleagues
and the Editorial Board RENSIT journal**