The 75th anniversary of professor Grigory Isaevich Greisukh

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Abstract. The article briefly describes scientific, pedagogical and organizational achievements of professor Greisukh Grigory Isaevich, Doctor of Engineering Science.

1. Introduction
October 29th, 2018, the head of the Physics and Chemistry Department of Penza State University of Architecture and Construction (PSUAC), Professor Grigory Isaevich Greisukh (Fig.1), Doctor of Engineering Science, has celebrated his 75th birthday. The article briefly describes the scientific, pedagogical and organizational achievements of Professor G.I. Greisukh, Doctor of Technical Sciences.

Figure 1. Professor G.I. Greisukh.
2. General biographical information

Date and place of birth: 29.10.1943, the city of Penza; Education: 1965 – Penza Polytechnic Institute, radio engineer; 1977 – Leningrad Polytechnic Institute, part-time doctoral program and defense of the candidate thesis in specialization Physical electronics incl. quantum electronics; 1989 – Leningrad Institute of Precise Mechanics and Optics, defense of the doctoral thesis in specialization Optical and optoelectronic devices. Career: from 1966 to 1971 – engineer of enterprises and ships of Ministry of shipbuilding industry and USSR Navy; from 1972 – PGUAS, engineer of scientific-research department, post-graduate student, senior lector (1977), assistant professor (1979), department professor (1990), head of the department (from 1991 till present). Awards: Certificate of Merit of USSR shipbuilding Minister (1970), honored employee of the Russian Federation Higher Education (1998), honored employee of Russian Science and Engineering (2016), Certificate of Merit of Penza Region Governor (2003), rank Veteran of Labor, All-Russian Exhibition Center gold medal (2001), All-Russian Exhibition Center silver medal (2002), honorary diploma of Optical society named after D.S. Rozhdestvensky with presentation of D.S. Rozhdestvensky commemorative medal (2011), honorary diploma of Optical society named after D.S. Rozhdestvensky with presentation of Yu.N. Denisyuk commemorative medal (2016). Unions membership: acting member of Russian Academy of Informational Supported Education and Optical society named after D.S. Rozhdestvensky.

3. Computer optics in Penza PSUAC

The scientific laboratory of optics at the Physics Department of Penza Civil Engineering Institute made a significant contribution into the establishment and development of computer optics. The engineer of scientific-research department and post-graduate student of Leningrad Polytechnic Institute named after M.I. Kalinin (LPI) G.I. Greisukh has established this laboratory in 1975 according to the agreement between the Leningrad Scientific and Production Association Svetlana (SPA) and Penza Civil Engineering Institute.

Academic advising in laboratory works was performed by the LPI Physical Electronics Department professor, Doctor of Physics and Mathematics, professor M.M. Butusov and lead specialist of SPA Svetlana candidate of Physical and Mathematical Sciences Yu.G. Turkevich. The main direction of work was associated with the use of wave optical phenomena and, in particular, the rapidly developing holography, for microelectronics purposes. At the first stage, the laboratory creator remained the only full-time employee, and then the laboratory welcomed engineers V.G. Shitov and S.A.Stepanov. Simultaneously with physical experiments, studies by computer numerical simulation methods were carried out. After the defense of Candidate thesis in 1978, G.I. Greisukh takes independent scientific management of the laboratory, engineer S.A.Stepanov becomes an executive worker.

The Coordination Councils on Optics and Holography of the USSR Academy of Sciences and, in particular, their leaders: academician K.K. Rebane, academician A.L. Mikaelyan and academician Yu.N. Denisyuk, the founder of national holography have comprehensively supported the laboratory’s activity. The scientific secretary of the Coordinating Council for Optics of the USSR Academy of Sciences, candidate of engineering sciences I.M.Efimenko and head and primary constructor of Central design bureau of unique instrument engineering in the USSR Science Academy, Doctor of Physics and Mathematics I.I. Sisakyan for many years have been providing invaluable assistance in shaping the research topics and financing. Financing was carried out through economic contracts by enterprises and scientific organizations of Leningrad, Moscow and other cities of the country. Contractual funds allowed to purchase the necessary laboratory equipment, including lasers, interferometric table with the necessary equipment, as well as the first personal computers made in the USSR.

Lack of own production center was balanced by cooperation with leading scientific or scientific and production centers of the country such as Physics and Technology Institute named after A.F.Ioffe of the USSR Science Academy, State Optical Institute named after S.I.Vavilov, Scientific and Production Association Svetlana (Leningrad), Acoustic Institute of the USSR Science Academy (Moscow), State Institute of Applied Optics (Kazan), Samara State Aerospace University named after academician S.P. Korolev, Institute of Image Processing Systems of the Russian Academy of Sciences.
In order to carry out more ambitious projects, informal creative teams were formed, which, along with employees of PSUAC, included representatives of other organizations. The most prominent examples of such cooperation were the author groups of two Russian and one English-language monographs on diffractive and gradient optics. These groups together with G.I. Greisukh and S.A. Stepanov included leading specialists of Leningrad SPA Svetlana, Candidates of Sciences S.T. Bobrova and Yu.G. Turkevich as well as the researcher of the USSR Academy of Sciences, Candidate of Engineering Science.

After 1991, the activity of the scientific optical laboratory at the Physics Department was supported by the Joint Council on Optics of the Russian Academy of Sciences and was funded by government programs and grants from industry ministries. Over the years of its existence, the laboratory has completed over 25 contractual and state budgetary R&D works.

**4. Key results of scientific activity**

For forty-seven years dedicated to optical science, G.I. Greisukh made a significant contribution to the development of the theory, principles of construction, and calculating methods of optical systems with aspheric, diffractive, and gradient elements. In practical terms, his efforts were directed towards the improvement of real optical and optoelectronic devices, due to the use of a new element base and continuously improved software used in the calculation and design.

According to the results of own developments of a creative team consisting of G.I. Greisukh, S.T. Bobrov and Yu.G. Turkevich Leningrad branch of publishing house Mashinostroenie published the first public monography devoted to focusing diffractive elements and optical systems based on them in 1986 [1]. In 1990 G.I. Greisukh together with I.M. Efimenko published a small monography which for the first time has presented the results of contrastive analysis of aberration features of diffractive and gradient lenses [2]. Finally, in 1997 the USA SPIE Press publishing house published an English-language monograph reflecting the achievements of the authors’ group in both diffractive and gradient optics [3].

G.I. Greisukh and his colleagues have made a significant contribution into theory and calculation methods of hybrid optical systems, which include elements of different types and also into research and evaluation of the capability of such systems. At this point, the following scientific results are considered the most prominent.

Development of aberration calculation methods for optical systems, which include elements of different types: homogeneous spherical and aspherical lenses and mirrors, gradient and diffractive lenses based on pseudo-beam path tracking, whose trajectories are calculated in the approximation of smallness preassigned order [4-8].

Research and comparison of the correctional ability of diffractive, homogeneous and gradient lenses [9-12].

Development of design concepts, methods, algorithms and software for designing optical systems implemented using aspherical, diffractive and gradient elements and having different functions:

- high-resolution object lens [13-19];
- optical path of information transferring devices [20];
- ultra-fine rigid endoscopes [21-23];
- optical path of projected displays and TV receivers [24-26];
- object lenses of infrared, visible, ultraviolet and X-ray electromagnetic radiation spectrum [27-40].

In recent years, the research team, headed by G.I. Greisukh, has published a series of articles devoted to analyzing and reducing the dependence of the kinoform optical elements diffraction efficiency on the wavelength and angle of radiation incidence on an element in leading Russian and foreign optical journals. The acquiring of the results within the frames of strict diffraction theory provides their significance [41-48].

5 candidate and 2 doctoral theses were successfully prepared and defended due to using the results of scientific researches accomplished under the supervision of professor G.I. Greisukh.
G.I. Greisukh is an active author and reviewer of scientific journal Kompjuternaya optika (Computer optics), he significantly contributes into the success of the journal, that reached the top half of journals indexed by the bibliometric database Scopus in 2017 [49]. Monographs of G.I. Greisukh are well-known among specialists in optics around the world, they are actively used and cited, in particular by scientists of leading scientific school of the Russian Academy of Science member V.A. Soifer [50-53].

5. Conclusion
In conclusion, we would like to wish Grigory Isaievich Greisukh robust health and energy to continue his scientific researches.

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