

SERGEĬ MIKHAĬLOVICH RYTOV

(In Honor of his 60th Birthday)

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ON 3 July 1968 one of the most eminent radiophysicists in the Soviet Union, Professor Sergeĭ Mikhaĭlovich Rytov, celebrated his 60th birthday.

His principal works may be divided into three major groups:

- 1) Theory of oscillations and acoustics.
- 2) Wave propagation, electrodynamics and optics.
- 3) Statistical radiophysics.

In each of these fields Rytov can be credited with accomplishments of major significance, which have won broad recognition both in this country and abroad. Some of these accomplishments were fundamental to the development of new directions in theoretical radiophysics.

Of Rytov's works mention should primarily be made of his doctoral dissertation, "Modulated Oscillations and Waves" (1938), which, immediately following its publication in Trudy FIAN (Transactions of the Physics Institute of the USSR Academy of Sciences), had become a handy reference work to many investigators in the field of oscillation theory. Rytov's studies of parametric systems as well as his development of the perturbation method and its application to the problem of the stabilization of oscillator frequency are among the principal achievements of the Soviet school of the theory of nonlinear oscillations. In 1935 he initiated a series of studies of the diffraction of light by ultrasonic waves. The results of these studies immediately attracted widespread attention and were summed up by their author in the monograph, *Diffraktsiya sveta na ul'trazvukovykh volnakh* (Diffraction of Light by Ultrasonic Waves). The method of smooth perturbations that he had developed has in time become a powerful tool for research into wave propagation in randomly-inhomogeneous media—a problem which is now one of the focal problems of theoretical radiophysics. Rytov was the first to provide a rigorous solution of the problem of the reflection of electromagnetic waves from a layer with a negative dielectric constant, and to indicate the correct electrodynamic approach to the problems of wave propagation in tubes and in general transmission lines with losses. He also completely elucidated the problem of the relationship between the Poynting vector, the group-velocity vector, and energy density during the propagation of electromagnetic waves in anisotropic media. That cycle of studies also included Rytov's optical studies which dealt with a new type of phase diffraction structures.

His studies of statistical radiophysics, collated in two monographs*, opened up a new orientation in the



theory of thermal fluctuation noise and fields, assuring a unified approach to the thermal electromagnetic fields over the entire frequency range—from the quasistationary region to optical frequencies. The method worked out by Rytov has received universal recognition, has been incorporated in textbooks, and is successfully applied in practice.

Mention should also be made of his work in other fields of statistical radiophysics, and particularly in the theory of fluctuations in self-oscillating systems.

In 1958 Rytov transferred from the FIAN to the Radiotechnical Institute of the USSR Academy of Sciences where since then he has been head of the Radiophysics Laboratory. Of his studies during this recent period mention should specially be made of his work on the theory of parametric amplifiers and on wave propagation in randomly-inhomogeneous media.

This description of Rytov as a scientist would have been incomplete without mentioning his extensive activities as an educator. For more than 30 years now he has been teaching at the Moscow and Gor'kiĭ universities. Since 1947 he has been giving lectures at

*Teoriya elektricheskikh fluktuatsii i teplovogo izlucheniya (Theory of Electrical Fluctuations and Thermal Radiation), Teoriya ravnovesnykh teplovykh fluktuatsii v elektrodinamike (Theory of Equilibrium Thermal Fluctuations in Electrodynamics) (in collaboration with M. L. Levin).

the Moscow Physico-technical Institute and heading the Department of Radiophysics. Here it is worth noting that at one time Rytov was one of the closest students and co-workers of L. I. Mandel'shtam. The methods and procedures characteristic of the school of Mandel'shtam were elaborated and expanded by Rytov and, thanks to him, they have become adopted by a large number of present-day physicists who are currently doing creative work. Anyone who has ever had occasion to hear Rytov even once has been struck by his pedagogical mastery, the clarity and polish of his utterances, the depth of insight into physics provided in his lectures. This applies equally well to his monographs and particularly to his *Vvedeniye v statisticheskuyu radiofiziku* (Introduction to Statistical Radiophysics).

Rytov is not only a teaching professor but also head of the General Moscow Seminar on Statistical Radiophysics which evaluates any significant study in that domain. The range of activities of this Seminar is steadily widening and specialists from the Gor'kii, Khar'kov, and other radiophysics schools are drawn to

participate in it. Rytov's opinion, which is often decisive, is listened to both by radioastronomers and biophysical and geophysical experts, as well as by physicists from the other branches of physics, particularly whenever a reappraisal of traditional views is concerned.

Rytov devotes a great deal of effort and attention to public scientific activities. He is a member of the Editorial Board of the journal *Radiotekhnika i élektronika* (Radio Engineering and Electronics), of the Scientific Council on Radio Wave Propagation at the USSR Academy of Sciences, of the Methodological Council for Physico-mathematical Sciences at the All-union Znaniye (Knowledge) Society, of the United Interdepartmental Council on the Sun-Earth Problem, etc.

He is a recipient of two orders of the Labor-Red-Banner as well as of medals of the USSR. He has been awarded the A. S. Popov Medal and the L. I. Mandel'shtam Prize.

Currently Rytov is in the prime of his creative vigor. Let us wish him even greater accomplishments.