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Dear readers!

Both this issue and, partially, the next issue of the Journal of Communications Technology and Electronics contain papers based on the reports made at the conference *Problems in Microwave Electronics* held on October 24–25, 2013, at the Moscow Institute of Electronics and Mathematics, the Higher School of Economics (national research university) (MIEM HSE NRU).

The conference was devoted to the 40th birthday of the permanent All-Russian Scientific Workshop *Problems in Electronics* organized by MIEM, the section of microwave electronics and corpuscular optics of the Scientific council on the problem of physical electronics (the USSR Academy of Sciences), and the section of electronics (Russian Scientific and Technical Popov Society for Radio Engineering, Electronics, and Communications (Popov Society)). The first session of the workshop was held on November 27, 1973, and, since then, several sessions have been held every year. The most urgent problems in microwave electronics, including physics of new emission and generation mechanisms, new theoretical methods, and problems concerned with computer-aided systems of designing of instruments and devices are discussed at these sessions. The initial purpose of the workshop was the exchange of information and coordination of theoretical research. Later, experimental investigations in the field of microwave electronics and methods of microwave oscillation generation and amplification were included in the scope of the workshop.

At the conference, problems of vacuum and microwave electronics in the following areas were considered:

(i) vacuum electron generators and amplifiers;

(ii) solid-state microwave devices;

(iii) special electrodynamic structures such as slow-wave systems, metamedia, and mode transformers.

Most of the reports are devoted to devices, elements, and methods of microwave electronics. In this field, the Russian science has a number of recognized world-class achievements including the following:

(i) The development of the principle and technology of design of a backward-wave tube (BWT) with multirow slow-wave systems that were a prototype of photonic crystals intensely investigated today. By now, emission sources operating within the range continuously covering the millimeter and submillimeter wavelength bands and stretching to a wavelength of 0.2 mm have been created on the basis of such BWTs;

(ii) The development of the first gyrotrons, which are high-power electron devices that operate on the basis of cyclotron resonance and are designed in numerous countries, in particular, for plasma heating with millimeter waves in facilities for controlled thermonuclear fusion;

(iii) The development of multibeam clystrons that have made it possible to substantially extend the possibilities of modern radars and other radio military and civil systems;

(iv) The development of a nonlinear theory, simulation techniques, and computer-aided design of vacuum electron microwave devices that have provided for a reliable basis for designing and development of instruments.

Unfortunately, many of these results and technologies were lost in Russia in the 1990s, while, in foreign countries, the interest in vacuum electronics of, especially, the millimeter- and submillimeter-wavelength bands has substantially increased. This fact is indicated, for example, by reports made at important international annual conferences on vacuum electronics that have been held in the USA and other countries since 2000.

At the conference *Problems in Microwave Electronics*, many reports are devoted to principles of creation, investigation, and development of millimeter-and submillimeter-wavelength vacuum electron devices such as BWTs, gyrotrons, orotrons, etc., which remain the main sources of millimeter-and submillimeter-wavelength coherent emission. In other reports, the possibilities of applying field-emission cathodes in devices and the possibilities of obtaining new properties of generation and amplification with the use of modulation of cathode emission are investigated. Note reviews of numerous results on generation of chaotic oscillations and the possibilities of creation of communication lines based on these oscillations. The reports made at the conference present new results on methods and programs of numerical solution of problems in microwave electromagnetics, a number of analytical and experimental results of the solution of these problems and application of microwave technologies.

The reports presented at the conference and the corresponding papers in this issue of the journal will be helpful for designers and researchers of microwave electron devices, lecturers, and postgraduate and senior students of higher school institutes.

Professor V.A. Solntsev, the Chairman
of the Organizing Committee of the conference
Problems in Microwave Electronics,
the Head of the workshop Problems in Electronics

Translated by I. Efimova