BOOK REVIEW

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

High-Power Microwave Sources

Editors	Victor L. Granatstein and Igor Alexeff
Publisher	Artech House Inc. 686 Canton Street Norwood, Massachusetts 02062 (1987)
Pages	564
Price	$70.00
Reviewer	T. V. George

The development of high-power, high-frequency electromagnetic wave sources has experienced a rapid growth in the last decade. This growth has been stimulated by the need for high-power millimetre wave sources for uses such as electron cyclotron heating of fusion plasmas, advanced accelerators in high-energy physics, and military applications. The advent of powerful computer techniques for analyzing microwave circuits and electron beam trajectories, availability of new materials that could withstand high-power deposition, and advanced industrial fabrication methods have contributed to the spectacular progress in this area. This rapid growth has necessitated a systematic compilation of the new information for the benefit of scientists, technologists, and students entering the field. Drs. Granatstein and Alexeff are to be congratulated for collecting the pertinent information and providing it in the form of a book entitled *High-Power Microwave Sources.*

The book contains 14 chapters, each written by experts in the field who gave a set of lectures on the respective topics for a course on the same subject offered in conjunction with the 1986 Institute of Electrical and Electronics Engineers Plasma Science Conference. The material is arranged in three parts: Introduction and Basic Techniques, Fast-Wave Devices, and Slow-Wave Devices and Virtual Cathode Oscillators. In part 1, the theoretical concepts of microwave devices (B. Levush and A. Drobot) are introduced in the first chapter, which is followed by chapters on technology (C. Wharton) and particle simulation (C. Birdsall). The remainder of the book covers specific devices classified according to whether the phase velocity of the electromagnetic wave is faster or slower than the velocity of light in the device. Part 2 covers fast-wave devices in five chapters, which include the gyrotron (J. Baird and V. Granatstein), free-electron laser (J. Pasour), and orbitron (J. Burke, W. Manheimer, E. Ott, and I. Alexeff). Discussion includes overviews of the physics of the device and excellent summaries of the current state of technology. The first two chapters of the third part cover cross-field devices (Y. Lau), the relativistic magnetrons (J. Benford), and the stimulated Cerenkov radiators (W. Case and J. Walsh). The last two chapters of part 3 cover a new device, the viractor (D. Sullivan, J. Walsh, E. Coutisas, and L. Thode). Each chapter contains extensive lists of references that encompass the subject matter in its totality.

High-Power Microwave Sources covers all major technologically relevant topics that have undergone rapid development during the past decade. It is well written and the subject matter is described with sufficient clarity and the right degree of depth and breadth. Newcomers to the field and well-established technologists would both find this book useful. New discoveries are bound to make periodic updating of any such books necessary. Until then, it is highly recommended as a good reference book.

T. V. George has been a program manager in the Office of Fusion Energy, U.S. Department of Energy, for the past 14 years. He currently manages the high-power millimetre wave source development program of the Office of Fusion Energy, which funds the development of high-power continuous-wave and pulsed gyrotrons. Current emphasis is in developing megawatt steady-state gyrotrons in the frequency range up to 280 GHz. Dr. George received his PhD from the University of Illinois, Urbana, in 1964 and remained there as an assistant professor in the Department of Electrical Engineering until 1966. He then joined the Westinghouse Research Laboratory and conducted research on a number of topics including diagnostics of plasmas by means of microwave, far-infrared, and optical techniques before joining the Office of Fusion Energy in 1975.