

BOOK REVIEWS

G. Peuschner

HEATING WITH MICROWAVES*

Reviewed by V. K. Benzar'

The development of microwave technology has opened up new fields for the use of dielectric heating. The use of powerful centimeter wave oscillators, i.e., magnetrons, makes it possible to intensify many technological processes in comparison with high-frequency heating.

Microwave applications are very diverse: sterilization of food products; pulverization of natural stone and concrete; drying of wood, medical preparations, ceramics, yarn; gluing of veneer; welding of thermo-plastic materials and many others.

More than 300 articles have been published on microwave heating. However, diverse and partly contradictory information does not permit a complete global determination of the given problem.

The book by G. Peuschner is the first attempt toward a generalization of disconnected information on the technology of microwave heating. The material of the book is presented in 13 chapters.

In the first chapter a short view of the development of the technology of dielectric heating and the justification for the change-over to the microwave range are given. Electronic instruments for the generation of radiowaves in the centimeter range are described.

In the second chapter the physical principle of operation of a magnetron as a generator of microwaves is discussed and its construction is described.

The basic concepts in the choice of the operating regime of the magnetron in continuous generation are discussed in detail in chapter three.

The problems related to the alternating and direct current feed to the magnetron are discussed in chapter four.

The practical schemes for power supply and cooling of magnetron oscillators are given in chapter five.

The sixth chapter is devoted to the theory of interaction of a variable electric field with a dielectric. Interactions of electromagnetic waves with a real dielectric are discussed.

The electromagnetic processes occurring in the elements of the microwave systems are elucidated in chapter seven taking specific examples.

The eighth and ninth chapters, which make up one third of the book, are devoted to the problems of heating of dielectrics in the fields of traveling and standing waves. The discussion of the material of these chapters is accompanied by a large number of illustrations which help to analyze the content in detail and, in some cases, to reproduce the construction of the investigated unit. The technical aspect of each problem, i.e., the connection of the circuit elements, their adjustment etc, is described in detail.

In the tenth chapter a summary of triode oscillators for operation in the low-frequency part of the microwave range is given. The circuits and constructions of triode oscillators are described.

The effect of microwave radiation on body tissues is discussed in chapter eleven from the point of view of safety techniques. Illustrations are presented.

Chapters twelve and thirteen give the basic ideas on the techniques of measurements at superhigh and low frequencies, necessary for practical operation with microwave oscillators.

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In the appendices the characteristics of some materials are presented and dielectric properties of different materials in a wide range of frequencies and temperatures are given. The bibliography includes 296 references.

The author has succeeded in discussing the complex material on the technology of microwave heating in an accessible and clear manner. The translation by E. Ya. Pastron from English has been done professionally and merits high appraisal.

A wide range of scientific and engineering-technical workers interested in dielectric heating will undoubtedly find this book very interesting and useful.