Microwave Abstracts

Based on technical merit and timeliness, microwave papers in journals published outside the United States have been selected and compiled below, generally with brief abstracts. Reprints of the papers may be obtainable by writing directly to the author or to the source quoted.

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Papers from Journals Published in the Scandinavian Countries

Compiled by M. M. Brady, Norconsult A. S., 1322 Hövik, Norway. Journals from Denmark, Finland, Norway, and Sweden were scanned. Articles are in one of the four Scandinavian languages, English or German as noted.

1
Wave Propagation in a Parallel-Plate Waveguide Partially Filled with a Hot and Inhomogeneous Plasma, by P. O. G. Hedvall (Microwave Department, Royal Institute of Technology, Stockholm, Sweden); *Ericsson Technics*, vol. 22, pp. 389–401, 4th Quarter 1966.

The TM wave in parallel-plate waveguide problems is treated. "Plasma" modes, electrostatic modes, and perturbed waveguide modes are shown to exist, all having a phase velocity greater than the mean thermal velocity of the plasma electrons. (In English.)

2
Non-Linear Coupling between Slow and Fast Waves in a Waveguide Partially Filled with a Plasma, by P. O. G Hedvall (Microwave Department, Royal Institute of Technology, Stockholm, Sweden); *Ericsson Technics*, vol. 22, pp. 369–387, 4th Quarter 1966.

A cold homogeneous plasma slab in a parallel-plate waveguide is studied. One slow primary wave can nonlinearly excite another fast wave which has a considerable amount of field energy outside the plasma and can be picked up by conventional couplers. The mechanism may provide a method of coupling to slow plasma waves. (In English.)

3
Synthesis of Non-Minimum Phase Microwave Filters, by T. Fjällbrant (MI Division, Telefonaktiebolaget LM Ericsson, Stockholm, Sweden); *Ericsson Technics*, vol. 22, pp. 403–427, 4th Quarter 1966.

Reactive elements are combined with a hybrid junction to yield a nonminimum phase filter family useful in FM and other systems requiring special phase characteristics. A simplified synthesis procedure is presented. (In English.)

4
Computation of Dielectric Discontinuities in Waveguide, by T. D. Iveland (Electronics Lab., Norwegian Institute of Technology, 7034 Trondheim, Norway); *Elektroteknisk Tidsskrift*, vol. 81, pp. 82–86, February 1968.

The variational method usually used to compute equivalent networks for metallic discontinuities is extended to encompass dielectric obstacles in waveguide. A derivation of general formulas for impedance parameters is suggested. Examples in X-band are shown to confirm the theory. (In Norwegian.)

5
Microwave Printed Circuits, by H. M. Fjosne (Balders vei 5, 7000 Trondheim, Norway); *Elektroteknisk Tidsskrift*, vol. 82, pp. 140–144, March 6, 1969.

Printed alternatives to waveguide are discussed and their electrical properties, loss, and power capabilities are presented. Discontinuity and construction problems are summarized. (In Norwegian.)

6
Gunn Oscillator Experimental Results, by H. J. Fossum and G. Rosenberg (Norwegian Defence Research Establishment, Box 25, 2007 Kjeller, Norway); *Elektroteknisk Tidsskrift*, vol. 81, pp. 274–278, May 30, 1968.

Warner's simple theory of cavity-controlled Gunn oscillations is discussed and compared with experimental results in the frequency range 250–600 MHz. The maximum experimental efficiency of 10 percent exceeds the predicted value. It is shown that this may be explained by the harmonic currents and voltages possible in the experimental setup. (In Norwegian.)

7
Varactor-Diode Circuit Tuning, by M. M. Brady (Norconsult A.S., Box 9, 1322 Hövik, Norway); *Elektroteknisk Tidsskrift*, vol. 81, pp. 485–490, 19 September 1968.

Varactor-diode tuning of resonant circuits is discussed and normalized equations are developed for designing circuits. Practical nomographs to translate varactor data-sheet parameters into circuit performance are presented. The equations and nomographs allow more rapid design than formerly possible. (In Norwegian.)

8
Radiation from Log-Periodic Antennas, by J. Jacobsen (Laboratory for Electromagnetic Field Theory, Technical University of Denmark, Lyngby, Denmark); *Ingeniören: Forsking*, vol. 78, pp. 110–112, 15 April 1969.

Generally reviews the state of the art in log-periodic antennas and summarizes the work carried out at the Technical University of Denmark. (In Danish.)

9
Future Microwave Sources, by H. Steyskal (Swedish Defence Research Institute. FOA 3, Stockholm, Sweden); *Elteknik*, vol. 10, pp. 123–129, September 1967.

Physical limitations and extrapolations based on today's tubes and solid-state devices are used as a basis for a prognosis of commercially available microwave sources up to 1975. (In Swedish.)

10
YIG Components Improve Microwave Systems, by P. Röschmann and R. Gustavsson (Philips Zentral-laboratorium, Hamburg, Germany, and Sivers Lab AB, Elektravägen 53, Stockholm, Sweden, respectively); *Elektronik i Teori Och Praktik*. vol 8, pp. 48–49, March 1968.

Presents a general review of the applications of YIG components in electronically tuned microwave systems. (In Swedish.)

11
Mobility and Temperature of Electrons in Polar Semiconductors, by K. Blötekjaer (Faculty of Electrical Engineering, Norwegian Institute of Technology, 7034 Trondheim, Norway); *Arkiv för Fysik*, vol. 33, pp. 105–120, February 15, 1967.

The transport of electrons due to an electric field in a polar semiconductor is treated with the assumption of a displaced Maxwellian velocity distribution. It is assumed that the only scattering is from optical phonons. Exact expressions are obtained for the drift velocity and the electron temperature. At low lattice temperatures they are substantially different from earlier, approximate results. In particular, if the lattice temperature is less than 0.375 θ, where θ is the characteristic temperature of the optical phonons, the electron temperature is reduced when a weak electric field is applied. For higher field strengths the electron temperature is higher than the lattice temperature, but considerably below that predicted by the approximate theory. (In English.)

12
The Propagation and Coupling of Waves in Inhomogeneous Media, by O. E. H. Rydbeck (Research Laboratory of Electronics, Chalmers University of Technology, Göteborg, Sweden); *Arkiv för Fysik*, vol. 33, pp. 533–592, September 21, 1967.

The application of coupling methods to a two-wave system is studied and extended to an n-wave system. It is proved that this can be done in a surprisingly elegant and practically useful way, which permits a rapid first-order study of very complex systems. The study leads to an expression for, and a physical examination of the general WKB-type amplitude coefficients of n-wave systems together with practically useful intensity and energyflow relations. It is expected that the general methods presented, which actually constitute an unorthodox way of solving the *n*th order wave equation, will be found useful in many areas of complex wave propagation, especially in multianisotropic media. (In English.)

13
Quenching Experiments on N-Type Germanium, by B. Samuelsson (Department of Physics, Chalmers University of Technology, Göteborg, Sweden); *Arkiv för Fysik*, vol. 35, pp. 321–327, 18 March 1968.

N-type germanium samples with normal dislocation density (about $10^3/cm^2$) were rapidly cooled from high temperatures. Acceptor centers were formed during quenching and their number was studied by resistivity measurements. The observed concentration of thermal acceptors was $7.2\times10^{24} \exp(-1.9eV/kT)/cm^3$ and the defects were identified as vacancies. Annealing was studied in the temperature range 300°–500°C. The annealing curves were of the exponential decay type. A total recovery was obtained at 400°C, the time constant at this temperature being about 13 hours. (In English.)

14
The Microwave Slot Antenna, by M. M. Brady (Norconsult A.S., Box 9, 1322 Hövik, Norway); *Elektronik* (Copenhagen), vol. 6, pp. 18–29, November 1968.

The different illuminations for slotted-waveguide antennas are discussed and the design equations pertinent to side-slotted rectangular-waveguide antennas for marine radar use are derived in detail. The theory is illustrated by comparing it against experimental results for 70- and 81-slot antennas for 9410 MHz. Cross-polarization suppression and squint correction are discussed. (In Norwegian.)

15
New Components Expand Possibilities for Microwave Technology, by C. G. Lundqvist (Research Institute for National Defence, FOA, Stockholm, Sweden); *Elektronik* (Stockholm), vol. 9, pp. 39–42, March 1969.

A review of integrated- and micro-circuit state of the art, based mostly on U. S. work. (In Swedish.)

16
Maximum Bandwidth Performance of a Single-Varactor Parametric Amplifier with a Single-Tuned Idler Circuit, by V. Porro (Technical University of Helsinki, Helsinki, Finland); *Sähkö*, vol. 42, pp. 183–186, May–June 1969.

A theory is presented for the optimum design of broad-band parametric amplifiers having single-tuned idler circuits. The actual properties of the separation filter between the signal and idler circuits are taken into account. The optimum design of the separation filter and the optimum choice of idler frequency for a given varactor are discussed. (In English.)

17
Certain Aspects of Thin-Film Microwave Components, by K. Mannersalo and T. Stubb (Technical University of Helsinki, Helsinki, Finland); *Sähkö*, vol. 42, pp. 23–27, January 1969.

The mechanical and electrical properties of various substrate materials are compared at microwave frequencies. Conductor and dielectric dissipation losses are discussed and related to their effects on performance. Impedance matching requirements and their realizability are presented. (In English.)

18
Newer Explanations of Bulk-Effect Oscillations, by A. Norbotten (Norwegian Defence Research Establishment, Box 25, 2007 Kjeller, Norway); *Elektronik* (Oslo), vol. 1, pp. 16–22, November 1967.

A general discussion of bulk effects, including Gunn, avalanche, and Reed diode devices. The applicability of each effect as a microwave generator is discussed. (In Norwegian.)

19
Hot Electrons in Semiconductors, by K. Blötekjaer (Faculty of Electrical Engineering, Norwegian Institute of Technology, 7034 Trondheim, Norway); *Elektronik* (Oslo), vol. 2, pp. 4–11, May 1968.

A tutorial discussion of semiconductor devices operating on electron temperature dependence on applied field. Particular cases of diffusion instabilities are discussed in detail. (In Norwegian.)

20
Use of Microwaves in Industrial Measurements, by T. Schaug–Pettersen (Institutt for radioteknikk, Norwegian Institute of Technology, 7034 Trondheim, Norway); *Elektronik* (Oslo), vol. 2, pp. 16–21, September, 1968.

The use of microwave measurement techniques to measure parameters in industrial production processes is discussed in general. Specific systems for measuring process velocity, distance, surface character, thickness, density, and humidity are described. (In Norwegian.)

21
Microwave Signal Transmission for Automatic Train Braking, by E. Myrseth and T. Schaug-Pettersen (Elektronikklaboratoriet, Norwegian Institute of Technology, 7034 Trondheim, Norway); *Elektronik* (Oslo), vol. 2, pp. 8–14, June–July 1968.

A microwave system has been developed for transmission of signal information from signal mast to locomotive for either remote indication or automatic braking in case of human error. The system comprises 10-GHz band transceivers mounted on the locomotives and semipassive transponders on each signal mast. Signals returned from transponders are modulated to convey the desired information. The returned signals are also given a 90° polarization rotation to avoid triggering of the locomotives' receiver by Doppler-modulated returned reflections or signals from another locomotive. (In Norwegian.)