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Six experts present a state-of-the art overview in five lecture videotapes.

Lightwave Communications

by Reinhard H. Knerr, AT&T Bell Laboratories, Breinigsville, PA*

Lightwave communications technology has reached a fairly sophisticated level. Applications range from multi-mode, low bit rate, short wavelength, LED systems to single mode, long wavelength laser systems which can transmit information at the rate of many gigabits per second. This author discusses the full range of lightwave communications applications including basic fiber technology, applications to optical data networks, direct detection and coherent lightwave systems.

Gallium Indium Arsenide Heterostructures for Low Noise Amplification, High Speed Logic Circuits, and Lightwave Detection

by Umesh K. Mishra, Technical Staff, Advanced Devices, Hughes Research Laboratories, and April S. Brown, Outstanding Technical Achievement Award Winner, Hughes Research Laboratories, CA

GaInAs has long been recognized for its excellent electronic properties and its wavelength compatibility with low loss optical fibers. The advent of advanced growth technologies such as MBE and MOCVD has led to the development of MODFETs and HBTs. This presentation addresses the status of the materials, device properties, circuits and applications of heterostructures based on InGaAs.

Gallium Arsenide - Key to Modern Microwave Technology

by Edward C. Niehenke, Westinghouse Defense and Electronics Center, Baltimore, MD*

Recent advances in microwave technology can be traced to developments in GaAs devices and circuits. GaAs has found its niche for the FET, HEMT, varactor, PIN, IMPATT and Gunn devices. The insertion of GaAs in the modern microwave system - whether communication, radar, electronic warfare, missile guidance or commercial - has improved reliability, efficiency, performance, and speed as well as extended the frequency range. GaAs is compared with other materials, its salient properties which benefit various semiconductor devices is highlighted, and the latest device technology for discrete devices and monolithic circuits is reviewed.

High TC Superconductivity: Facts and Fancy

by Richard E. Howard, AT&T Bell Laboratories, Microelectronics Research Dept., Holmdel, NJ

With the recent discovery of the high transition temperature superconductors, dramatic and wide-ranging claims have been made for the opening of a new era of technology. Examples that capture the imagination include high speed electronics, levitated trains, power transmission and high-field magnets for everything from controlled nuclear fusion to pollution control. While the new superconductors make the technology more accessible,the need for cryogenic colling still limits applications. A more serious limitation is in the existing array of materials problems. In this presentation, a balanced account of the potential applications for superconductivity and the problems yet to be overcome is given.

CAD of Hybrid and Monolithic Microwave and Millimeter-Wave MICs

by Rolf H. Jansen, Industrial Microwave and RF Techniques, Inc., Ratingen, West Germany*

With the availability of transistors having useful gain in the mm-wave range, and the advanced development of GaAs monolithic MICs in the last five years, the demand for accurate and reliable CAD up to the highest frequencies is growing. The economic design of MMICs without CAD is simply impossible. Yet the development of sophisticated computer-aided design tools is far behind the pace of technology. In this presentation, the electrical phenomena which complicate the design of MICs are discussed. Also given is an overview of existing CAD packages and their specific features including linear and nonlinear CAD and the advantages and shortcomings of frequency-domain and time-domain analysis. Various MMIC designs are also demonstrated.

*IEEE/MTT Society Distinguished Lecturer

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