



THE INSTITUTION OF ELECTRICAL AND ELECTRONICS ENGINEERS INC.

**MTT/ED/AP/LEO- SOCIETIES JOINT CHAPTER
& IEEE UMIST Student Branch
United Kingdom & Republic of Ireland Section**

IEEE SEMINAR

“There is a wave ...”

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Applications
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Date: Thursday 16th October 2003

Venue: room B29/MB - Department of Electrical Engineering and Electronics, UMIST,

Time: 12.00noon

(after the talk there will be refreshment)

ALL WELCOME

Abstract: Basic concepts in wave propagation and their relationship to the medium will be reviewed briefly and coupling (or “cross-talk”) between two transmission lines will be discussed and demonstrated by analogy. If the medium is a ferrite or a semiconductor immersed in a static magnetic field, the medium has “gyrotropic” properties that can be used to develop novel control components for radar and communication systems, and some classical types of such devices will be mentioned briefly. However, the size of such components has to be reduced as the wavelength becomes smaller and therefore at sub-mm wavelengths it may be advantageous if the devices are several wavelengths long. For example, distributed effects such as forward coupling may offer possibilities. Novel coupled wave behaviour occurs when a magnetised ferrite is placed between two coupled transmission lines and a class of novel components based on this behaviour will be described and results presented. Another approach to passive mm-wave control devices is to consider replacing ferrite parts with semiconductor parts. The classical junction ferrite circulator has limitations as the frequency of operation is increased and therefore a semiconductor junction circulator can be envisaged. Examples of these new devices for frequencies up to 120 GHz will be described and results for 30 and 60 GHz. will be presented. If time permits, proposals for a novel magneto-optical isolator and a circulator for operation at 1.33 μ m will be presented.