I-I COUPLING OF WAVEGUIDES BY RESISTIVE FILMS

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This paper is concerned with the application of resistive coupling structures, particularly in form of films, in waveguide- coaxial- and stripline-technics. However, in our new class of applications to be discussed, resistive films are used in a position essentially perpendicular to the electric field. Extending first suggestions by M. Schneider (thesis 1959) such devices may be analyzed in the following manner: A rectangular waveguide, operated in ordinary H 10-mode be divided in two- in general unequal – parts by a plane parallel to the broad side. If the dividing plane is assumed to have infinite conductivity, the two independent waves travelling in the same direction may also be interpreted as a superposition of two modes, called homopolar and antipolar respectively.

In case of the homopolar mode field vectors on both sides of the dividing plane are equal in magnitude and phase. For the antipolar mode, however, the dividing plane sees phase opposition and unequal magnitudes on opposing sides. It can be shown that in a stable antipolar mode the ratio of partial powers guided within the two parts of the guide is reversed compared to the homopolar mode.

If the dividing plane has finite conductivity (resistive film) the homopolar mode will not be influenced in any way, but the antipolar mode will experience attentuation. A detailed field theoretical treatment of the problem is contained in a thesis by B. Eliasson.

Application of this principle to several devices such as power dividers, directional couplers, resistive matching devices and attenuators will be treated and its relative merits compared to conventional technics. Resistive structures have their main advantages where precision, wide band properties and certain phase relations are more important that losslessness.