Abstracts

New Surface-Wave-Like Mode on CPWS of Infinite Width and its Role in Explaining the Leakage Cancellation Effect

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At the 1990 International Microwave Symposium we showed that a new mode, not previously recognized, could exist on coplanar waveguide of finite width. This mode can propagate down to zero frequency, and its field distribution resembles that of a TM/sub 0/ surface wave on a grounded dielectric layer. We therefore called this new mode a "surface-wave-like," or SWL, mode. We also demonstrated, both theoretically and experimentally, that this mode couples to the dominant CPW mode over a narrow frequency region. Although the frequency corresponding to this coupling region is relatively high, it is lower than the frequency at which the dominant CPW mode changes from a bound mode to a leaky mode. The two modes that couple are therefore real everywhere within the coupling region, so that the coupling behavior is exactly that of the classical forward directional coupling type. The behavior is illustrated in Fig. 1, which presents the normalized phase constant as a function of the normalized frequency. Power leaks from the dominant CPW mode in the form of a TE/sub 0/ surface wave on the ungrounded dielectric layer outside of the strip region, but that leakage occurs only for frequencies higher than the crossing between the CPW curve and the one for the TE/sub 0/ surface wave. In Fig. 1 the CPW curve stops at exactly that crossing point.

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