Abstracts

Effect of depletion layer on the propagation characteristics of MIS transmission lines

E.S. Tony and S.K. Chaudhuri. "Effect of depletion layer on the propagation characteristics of MIS transmission lines." 1999 Transactions on Microwave Theory and Techniques 47.9 (Sep. 1999, Part II [T-MTT] (Special Issue on Multilayer Microwave Circuits)): 1760-1763.

The effect of the depletion region that forms in a metal-insulator-semiconductor (MIS) transmission line is considered. MIS lines are normally modeled without regard to this effect. Studies conducted here show that ignoring the depletion region leads to erroneous results in estimating the propagation characteristics. For example, ignoring the effect of the depletion region leads to errors in computing the propagation constant. For the quasi-TEM mode of operation, the imaginary part of the propagation constant (attenuation constant) is off by up to 15%, and the phase constant is off by up to 3%. Moreover, for the slow-wave mode of operation, ignoring the depletion region leads to totally erroneous results, with errors of 50%-90%. Results presented here were obtained using a spatial-domain analysis utilizing the Green's function for a generalized multilayered lossy substrate.

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