Letters

Comments on "Transient Analysis of Single and Coupled Lines with Capacitively-Loaded Junctions"

KENNETH S. OLSON, GUANG-WEN PAN, AND BARRY K. GILBERT

In the above paper,[1] the authors have developed an analysis method for determining the transient behavior of a pair of coupled lines with a varied number of crossing strips—a method which appears to give correct results. Certain typographical errors occur within the paper and are pointed out here in order to assist those who are using the paper in their work.

Equation (8), on p. 954, gives the following equation for the reflection coefficient Γ_{01}:

$$\Gamma_{01} = -\Gamma_{10} = -\Gamma_{n+1,n} = \Gamma_{n,n+1} = \frac{Y_0 - Y_1}{Y_0 + Y_1}. \tag{1}$$

Upon examination of Fig. 2, on p. 953, it is seen that the equation should be written with sign corrections as follows:

$$\Gamma_{01} = -\Gamma_{10} = \Gamma_{n+1,n} = -\Gamma_{n,n+1} = \frac{Y_0 - Y_1}{Y_0 + Y_1}. \tag{2}$$

Equation (12), on p. 954, which is given as

$$T_{10} = T_{n+1,n} = \frac{2Y_1}{Y_0 - Y_1} \tag{3}$$

should be written

$$T_{10} = T_{n+1,n} = \frac{2Y_1}{Y_0 + Y_1}. \tag{4}$$

On p. 956, in the first column, second paragraph, the parallel-plate length is 6.75 mm, not 5.375 cm as given. The correct value appears in Figs. 7, 8, and 9 of the paper.

On p. 957, first column, close to the bottom, the following equation is given:

$$d_{o,e} = \frac{4(Y_{1o,e})^2(1 - a_{o,e})}{C^2_{do,e}}. \tag{5}$$

However, we find from substituting (27) into (A3) in the paper that

$$d = d_1 d_2 = \frac{4Y_1Y_2}{C_d^2} = \frac{4Y_1(aY_1)}{C_d^2} = \frac{4Y_1^2 a}{C_d^2}. \tag{6}$$

Thus, we obtain:

$$d_{o,e} = \frac{4(Y_{1o,e})^2 a_{o,e}}{C^2_{do,e}}. \tag{7}$$

In the paper, a discrepancy occurs in the use of the variable n. It is observed from Fig. 2 that $n+1$ discontinuities occur along the line; $n-1$ discontinuities result from crossing strips, and two result from impedance mismatches at the line ends. Because there are two discontinuities per crossing strip, we find that there are $\frac{n-1}{2}$ crossing strips in the structure. We define the number of crossing strips as $k_{\max}$ (compare with equation at the bottom of p. 953). Thus:

$$k_{\max} = \frac{n-1}{2} \tag{8}$$

or

$$n = 2k_{\max} + 1. \tag{9}$$

The structure used to obtain Figs. 7–9 contains ten crossing strips. The variable n should thus be given a value of 21 ($n = 2(10)+1 = 21$) instead of 10. This change should also be made in the second paragraph of text on p. 956.

Following the same line of reasoning, Figs. 12–14 on p. 958 should contain the expression $n = 51$ instead of $n = 25$. Also, in the second paragraph, first column of p. 958, "number n of crossing strips" should read "number $\frac{n-1}{2}$ of crossing strips."

In Appendix B, many of the equations are incorrect by a factor of $\epsilon_0\epsilon_r$ due to a mistake early in the Appendix. At the bottom of p. 962, the following equations should have $\epsilon_0\epsilon_r$ removed:

$$Y_{1o} = v_{1o}\epsilon_0\epsilon_r C_{1o} \tag{10}$$

$$Y_{2o} = v_{2o}\epsilon_0\epsilon_r C_{2o}. \tag{11}$$

They should read, respectively,

$$Y_{1o} = v_{1o}C_{1o} \tag{12}$$

and

$$Y_{2o} = v_{2o}C_{2o}. \tag{13}$$

As a result of this change, the following equations on p. 963 are affected:

$$Y_{2o,e} = \frac{\sqrt{\epsilon_r}\, C_{2o,e}}{120\pi} \tag{14}$$

$$D = \frac{C_{2o,e}}{2} h_1 \tag{15}$$

$$h_0 = \frac{C_{1o,e} - C_{2o,e/2}}{D} \tag{16}$$

$$Y^u_{1o,e} \cong \frac{\sqrt{\epsilon_r}\,(C_{1o,e} - C_{2o,e}/2)}{120\pi}. \tag{17}$$

These four equations should read, respectively,

$$Y_{2o,e} = \frac{C_{2o,e}}{120\pi\epsilon_0\sqrt{\epsilon_r}} \tag{18}$$

$$D = \frac{C_{2o,e}}{2\epsilon_0\epsilon_r} h_1 \tag{19}$$

$$h_0 = \frac{D\epsilon_0\epsilon_r}{C_{1o,e} - C_{2o,e}/2} \tag{20}$$

$$Y^u_{1o,e} \cong \frac{C_{1o,e} - C_{2o,e}/2}{120\pi\epsilon_0\sqrt{\epsilon_r}}. \tag{21}$$

Manuscript received March 16, 1987. This work was supported in part by the Defense Advanced Research Projects Agency under Contracts F29601-84-C-0016 and N66001-85-C-0037.

K. S. Olson and B. K. Gilbert are with the Special Purpose Processor Development Group, Mayo Foundation, Rochester, MN 55905.

G.-W. Pan is with South Dakota State University, Brookings, SD 57007.

IEEE Log Number 8716527.

[1] Q. Gu and J. A. Kong, *IEEE Trans. Microwave Theory Tech.*, vol. MTT-34, pp. 952–964, Sept. 1986.

0018-9480/87/1000-0929$01.00 ©1987 IEEE

Along this same line, (30), on p. 957, which reads

$$Y_{1o,e} \cong \frac{\sqrt{\epsilon_r}\,(C_{1o,e} - C_{2o,e}/2)}{120\pi} \tag{22}$$

should read

$$Y^u_{1o,e} \cong \frac{C_{1o,e} - C_{2o,e}/2}{120\pi\epsilon_0\sqrt{\epsilon_r}}. \tag{23}$$

Please note that for the coupled-line case, $Y^u_{1o,e}$ should only be used to calculate the discontinuity capacitance C_d. $Y^u_{1o,e}$ should not be used to calculate Γ, T, a, or d. Rather, $Y_{1o,e}$ should be used.

On p. 963, in Figs. 17 and 18, references to $C_{20,e/2}$ should read: $C_{2o,e}/2$. Also, in Fig. 18, the reference to $C_{10,e} - C_{10,e/2}$ should read $C_{1o,e} - C_{2o,e}/2$.

On p. 963, first column, the equations that read

$$v_{1o,e} = \frac{1}{\sqrt{\mu_0 L_{1o,e}\epsilon_0\epsilon_r C_{1o,e}}} \tag{24}$$

and

$$v_{2o,e} = \frac{1}{\sqrt{\mu_0 L_{2o,e}\epsilon_0\epsilon_r C_{2o,e}}} \tag{25}$$

instead should read, respectively,

$$v_{1o,e} = \frac{1}{\sqrt{L_{1o,e}C_{1o,e}}} \tag{26}$$

and

$$v_{2o,e} = \frac{1}{\sqrt{L_{2o,e}C_{2o,e}}}. \tag{27}$$

With these corrections implemented, the results of the paper can be shown to be correct, and the conclusions reported in the paper remain unaffected.

Comments on "Impedance Calculation of Three Narrow Resonant Strips on the Transverse Plane of a Rectangular Waveguide"

AN HONGMING

It has been called to the author's attention that the solution of (5) in the above paper[1] can be modified. In fact, $dj\overline{B}_T/df = 0$ yields

$$(F_1 + fF_2)(H_1 + fH_2) = 0$$

where

$$H_1 = F_2 \sum_{n=2}^{\infty} V_n Q_n^2 - F_1 \sum_{n=2}^{\infty} V_n Q_n S_n$$

$$H_2 = F_2 \sum_{n=2}^{\infty} V_n Q_n S_n - F_1 \sum_{n=2}^{\infty} V_n S_n^2 - F_1 \sum_{n=1}^{\infty} \sum_{m=1}^{\infty} U_{nm}$$

thereby giving the two solutions for the current ratio, i.e.,

$$f_1 = -\frac{F_1}{F_2}$$

$$f_2 = -\frac{H_1}{H_2}.$$

Obviously, f_1 results in $\overline{B}_T = 0$.

Instead of the solution (6) in the original paper, the above formulas are in simple form and may decrease the calculation time considerably.

Manuscript received March 30, 1987.
The author is with the Department of Electronics and Information Science, Lanzhou University, Lanzhou, Gansu Province, People's Republic of China.
IEEE Log Number 8716528.

[1] K. Chang, *IEEE Trans. Microwave Theory Tech.*, vol. MTT-32, pp. 126–130, Jan. 1984.

0018-9480/87/1000-0930$01.00 ©1987 IEEE