Comments and Corrections

Corrections to "A New Method for the Reduction of Crosstalk and Echo in Multiconductor Interconnections"

Frédéric Broydé and Evelyne Clavelier

***Index Terms*—Crosstalk, interconnections, multiconductor cable, signal integrity, transmission.**

In [1], the second equality in (7) is not correct and also the definitions of $\mathbf{V}_+$ and $\mathbf{V}_-$ have not been included. For a wave traveling toward the far end, characterized by the column-vector of the natural voltages $\mathbf{V}_+$ and by the column-vector of the natural currents $\mathbf{I}_+$, we have

$$\mathbf{V}_+ = \mathbf{Z}_C \mathbf{I}_+ \quad (1)$$

and, for a wave traveling toward the near-end characterized by the column-vector of the natural voltages $\mathbf{V}_-$ and by the column-vector of the natural currents $\mathbf{I}_-$, we have

$$\mathbf{V}_- = -\mathbf{Z}_C \mathbf{I}_-. \quad (2)$$

Using the definition of the impedance matrix $\mathbf{Z}_L$ of the load at the far end

$$\mathbf{V}_+ + \mathbf{V}_- = \mathbf{Z}_L(\mathbf{I}_+ + \mathbf{I}_-) \quad (3)$$

we first get

$$\mathbf{V}_- = \mathbf{Z}_C(\mathbf{Z}_L + \mathbf{Z}_C)^{-1}(\mathbf{Z}_L - \mathbf{Z}_C)\mathbf{Z}_C^{-1}\mathbf{V}_+ \quad (4)$$

and then

$$\mathbf{V}_- = (\mathbf{Z}_L - \mathbf{Z}_C)(\mathbf{Z}_L + \mathbf{Z}_C)^{-1}\mathbf{V}_+. \quad (5)$$

Equation (5) seems to have been first disclosed by Marx [2]. We note that

$$\mathbf{V}_- = (\mathbf{Z}_L + \mathbf{Z}_C)(\mathbf{Z}_L - \mathbf{Z}_C)^{-1}\mathbf{V}_+ \quad (6)$$

is *not* correct, in general. Consequently, [1, eq. (7)] should read

$$\begin{aligned}\mathbf{V}_- &= (\mathbf{Z}_L - \mathbf{Z}_C)(\mathbf{Z}_L + \mathbf{Z}_C)^{-1}\mathbf{V}_+ \\ &= \mathbf{Z}_C(\mathbf{Z}_L + \mathbf{Z}_C)^{-1}(\mathbf{Z}_L - \mathbf{Z}_C)\mathbf{Z}_C^{-1}\mathbf{V}_+. \quad (7)\end{aligned}$$

No other result of [1] need be changed, since only (5) was used.

In (8) of [1], ${}^t\mathbf{S}^{-1}$ denotes the transpose of the inverse of $\mathbf{S}$.

We also wish to mention that the idea of requiring that the diagonal elements of $\mathbf{P}$ are equal to zero [1, Sec. III] has previously been mentioned, and referred to as *diagonal matching* [3].

Manuscript received February 24, 2006. This paper was recommended by Associate Editor P. K. Rajan.

The authors are with Excem, 78580 Maule, France (e-mail: fredbroyde@eurexcem.com; eclavelier@eurexcem.com).

Digital Object Identifier 10.1109/TCSI.2006.879056

References

[1] F. Broydé and E. Clavelier, "A new method for the reduction of crosstalk and echo in multiconductor interconnections," *IEEE Trans. Circuits Syst. I, Reg. Papers*, vol. 52, no. 2, pp. 405–416, Feb. 2005.

[2] K. D. Marx, "Propagation modes, equivalent circuits, and characteristic terminations for multiconductor transmission lines with inhomogeneous dielectrics," *IEEE Trans. Microw. Theory Tech.*, vol. MTT-21, no. 7, pp. 450–457, Jul. 1973.

[3] Y. You, O. A. Palusinski, and F. Szidarovszky, "New matrix algorithm for calculating diagonally matched impedance of packaging interconnecting lines," *IEEE Trans. Microw. Theory Tech.*, vol. 47, no. 6, pp. 798–801, Jun. 1999.