Letters

Comments on "Cross-Coupling in Coaxial Cavity Filters—A Tutorial Overview"

Tim Reeves and Nicholas van Stigt

This TRANSACTIONS' April 2003 "Special Issue on RF and Microwave Tutorials" contained the above paper [1]. In [1, Sec. V-A], the author stated that he ". . . is not aware of any closed-form solutions that are capable of generating a coupling matrix for the nested structures of Section IV. Analytical methods exist for CT and CQ structures only."

The "nested structures" that the author describes have three or more signal paths. In a more general sense, there would be $N-1$ signal paths for third- or fourth-order filter structures or $N-2$ signal paths for filter structures of fifth order and higher.

The specific structures that the author refers to are the four-pole two asymmetric transmission zero filter and the five-pole three transmission zero filter. The general nomenclature given to these structures are "general sections" and "cascaded quintuplets," respectively. In [2], an analytical method for deriving the admittance matrix and, hence, the coupling matrix, is presented for the "general section" or the four-pole two asymmetric transmission zero filter. Likewise, the analytical method for deriving the admittance matrix and, hence, coupling matrix for the "cascaded quintuplet" or five-pole three transmission zero filter is presented in [3].

It is our interpretation of the author's comments quoted above that the material presented in [2] and [3] fulfills the definition of closed-form solutions that are capable of generating coupling parameters for the nested structures presented in [1].

REFERENCES

[1] J. B. Thomas, "Cross-coupling in coaxial cavity filters—A tutorial overview," *IEEE Trans. Microwave Theory Tech.*, vol. 51, pp. 1368–1376, Apr. 2003.
[2] T. B. Reeves, N. D. van Stigt, and C. W. Rossiter, "A method for the direct synthesis of general sections," in *IEEE MTT-S Int. Microwave Symp. Dig.*, May 20–25, 2001, pp. 1471–1474.
[3] T. B. Reeves and N. D van Stigt, "A method for the direct synthesis of cascaded quintuplets," in *IEEE MTT-S Int. Microwave Symp. Dig.*, June 2–7, 2002, pp. 1441–1444.

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Corrections to "Comparison of Fully Distributed and Periodically Loaded Nonlinear Transmission Lines"

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The above paper [1] contains several errors as delineated below.

1) Fig. 2(a) and (b) should be reversed.
2) The correct form of (1) is

$$f_{B,\mathrm{num}} = \frac{1}{\pi\sqrt{L_l \Delta z C_{\mathrm{ls}} \Delta z}} = \frac{1}{\pi \Delta z \sqrt{L_l C_{\mathrm{ls}}}}. \quad (1)$$

3) The second sentence below Fig. 6 should read "Fig. 7 shows the amplitude of this harmonic versus the ratio $f_{B,\mathrm{num}}/f_{c,\mathrm{ls}}$."
4) The second sentence of paragraph 2 on p. 1108 should read "Here Z_{cpw} is the characteristic impedance of the linear CPW, τ is the time delay corresponding to one elementary section, R_{DC} represents dc losses in the conductors, $C(V)$ is the voltage–variable capacitance of a single HBV, and R_s is its series resistance."
5) The first sentence of paragraph 3 on p. 1108 should read "Four input parameters are needed to determine the electrical model of an elementary section: the Bragg frequency f_B, the small-signal characteristic impedance Z_{cpw} of the CPW, its large-signal value Z_{ls} (set to a constant 50 Ω), and the number of nonlinear elements N."
6) The fourth sentence of paragraph 3 on p. 1108 should read "The possible domain of variation for Z_{cpw} is 60–120 Ω."
7) The correct form of the first equation on p. 1108 is

$$\tau = \frac{Z_{\mathrm{ls}}}{\pi f_b Z_{\mathrm{cpw}}}.$$

8) The third sentence of the last paragraph on p. 1108 should read "In the second step, the CPW per-length inductance $L_{\mathrm{cpw-z}}$ and capacitance $C_{\mathrm{cpw-z}}$, the zero-biased HBV capacitance C_{j0-z}, and the large-signal cutoff frequency $f_{c,\mathrm{ls}}$ are calculated."
9) The correct form of the second equation on p. 1108 is

$$R_{\mathrm{DC}} = \rho_{\mathrm{met}} \frac{d}{e_{\mathrm{met}} W}.$$

10) The correct form of the seventh equation on p. 1108 is

$$d = \frac{\tau}{\sqrt{\varepsilon_{\mathrm{reff}}}}.$$

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11) The third sentence of the first paragraph on p. 1109 should read "For the FD case, the best efficiency is only 4.8% with $Z_{\rm cpw} = 9.5\ \Omega$, $f_{c,{\rm ls}}/f_B = 4$ leading to $\Delta z = 1.145\ \mu$m (simulation step), and $L_{\rm FD} = 800\ \mu$m (the length $L_{\rm FD}$ was varied over 100-μm steps)."
12) The eighth sentence of the first paragraph on p. 1110 should read "If W is increased without increasing S, $Z_{\rm cpw}$ decreases, leading to a decrease of $Z_{\rm ls}$, and then a mismatched NLTL."
13) The sixth sentence of Section III-C on p. 1111 should read "To bring to the fore the importance of the mismatch between $Z_{\rm ls}$ and the load and source impedances, two sets of simulations were carried out for FD NLTLs, first using 50-Ω source and load impedances, meaning that the NLTL is strongly mismatched, and, second, with the source and load impedances made equal to $Z_{\rm ls}$."
14) The following paragraph should be inserted following the third paragraph on p. 1113 "Fig. 23 compares the measured results with SPICE simulations of the two NLTLs when biased to −6 V and fed by a 12-V peak–peak sinewave. Measurements were done using a Tektronix CSA 803 sampling oscilloscope."
15) The fourth sentence of the first paragraph on p. 1114 should read "We see that $|S_{21}|$ rapidly decreases for frequencies above 1200 and 2200 MHz, respectively."
16) The correct form of second equation on p. 1114 is

$$\mathrm{BW}_{\rm ds} = \frac{\frac{f_B}{3} - \frac{f_B}{5}}{\frac{f_B}{3} + \frac{f_B}{5}}.2 = \frac{1}{2} \equiv 50\%.$$

17) The second paragraph on p. 1115 should read "The waveform in Fig. 5(b) is the solution of the generalized van der Pol (GvdP) oscillator ordinary differential equation (ODE)

$$\frac{d^2y}{dt^2} - \frac{d}{dt}(ay - by^3) + y = 0$$

using $a = 7$, $b = 4$. Here, the cubic is

$$f(y) = -ay + by^3$$

and the solution was obtained using the 'ode15s' stiff ODE solver of MATLAB Release 12."

REFERENCES

[1] J.-M. Duchamp, P. Ferrari, M. Fernandez, A. Jrad, X. Mélique, J. Tao, S. Arscott, D. Lippins, and R. G. Harrison, "Comparison of fully distributed and periodically loaded nonlinear transmission lines," *IEEE Trans. Microwave Theory Tech.*, vol. 51, pp. 1105–1116, Apr. 2003.

Corrections to "Complex Permittivity Measurements of Common Plastics Over Variable Temperatures"

Bill Riddle, James Baker-Jarvis, and Jerzy Krupka

Despite our best efforts to present error-free measurements to the IEEE Microwave Theory and Techniques Society (IEEE MTT-S), one of the figures in the above paper [1] contains an incorrect scaling factor. In [1, Fig. 11], the loss tangent data for polycarbonate is low by a factor of ten. The correct data is shown in Fig. 1 in this paper. We apologize for any confusion this error may have caused.

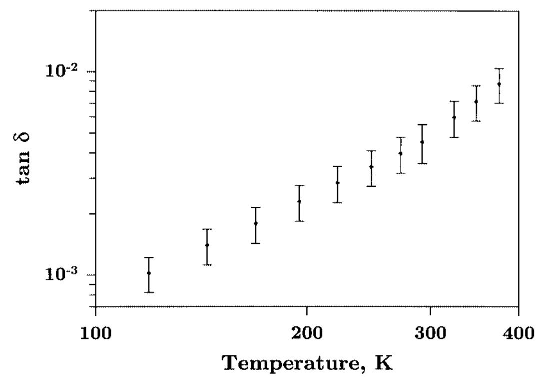

Fig. 1. Polycarbonate, $f \approx 11$ GHz, loss tangent versus temperature.

REFERENCES

[1] B. Riddle, J. Baker-Jarvis, and J. Krupka, "Complex permittivity measurements of common plastics over variable temperatures," *IEEE Trans. Microwave Theory Tech.*, vol. 51, pp. 727–733, Mar. 2003.

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