Letters to the Editor

A Note on the Double Fresnel Integral

L. LEWIN

In a recent paper[1] Penunuri introduces the functions

$$\mathrm{Cii}(x)=\int_0^x \frac{Ci(t)}{t^{1/2}}\,dt \quad \text{and} \quad \mathrm{Sii}(x)=\int_0^x \frac{Si(t)}{t^{1/2}}\,dt$$

where $\mathrm{Ci}(x)$ and $\mathrm{Si}(x)$ are the Fresnel integrals. Since a substantial Appendix is denoted to the evaluation of these expressions, it appears that the author may have overlooked a simple derivation, obtained by integration by parts, which expresses them directly in terms of the Fresnel integrals. The results are

$$\mathrm{Cii}(x)=2x^{1/2}\mathrm{Ci}(x)-(2/\pi)^{1/2}\sin x \tag{1}$$

$$\mathrm{Sii}(x)=2x^{1/2}\mathrm{Si}(x)+(2/\pi)^{1/2}[\cos x-1] \tag{2}$$

where, following Penunuri,

$$\mathrm{Ci}(x)=(1/2\pi)^{1/2}\int_0^x \frac{\cos t}{t^{1/2}}\,dt \tag{3}$$

$$\mathrm{Si}(x)=(1/2\pi)^{1/2}\int_0^x \frac{\sin t}{t^{1/2}}\,dt. \tag{4}$$

Using tabulated values for Ci and Si, (1) and (2) can now be readily evaluated.

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[1]D. Penunuri, "A numerical technique for SAW diffraction simulation," *IEEE Trans. Microwave Theory Tech.*, vol. MTT-26, pp. 288–294, Apr. 1978.

Correction to "Sensitivity Analysis of Coupled Microstrip Directional Couplers"

S. D. SHAMASUNDARA AND K. C. GUPTA

With reference to the above paper[1], the following corrections may be noted.

1) Equation (13) should read as

$$S_{Z_{0e}}^{BW}=-S_{Z_{0o}}^{BW}=\frac{2}{\pi}\left[\frac{C}{BW}\right]\left[\frac{1+mC}{1-mC^2}\right][m(1-m)(1-C^2)]^{1/2}.$$

2) Values of sensitivity of bandwidth shown in Fig. 1 and value of bandwidth shown in Fig. 2 are incorrect because of a computational error. The correct results are given in Figs. 1 and 2 of this communication.

3) In Table II Directivity for Ideal coupler should read "Infinite."

4) Value of $(\Delta C)_{\max}/C$ given in the ninth line of the left column on page 793 should read 0.061 and not 0.61.

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The authors are with the Department of Electrical Engineering, I.I.T. Kanpur 208016, India.
[1]S. D. Shamasundara and K. C. Gupta, "Sensitivity analysis of coupled microstrip directional couplers," *IEEE Trans. Microwave Theory Tech.*, vol. MTT-26, pp. 788–794, Oct. 1978.

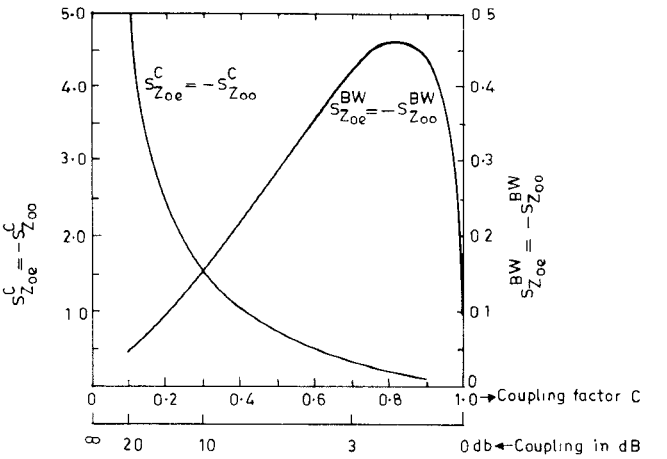

Fig. 1. Sensitivities of coupling and bandwidth with Z_{0e}, Z_{0o} for coupled TEM-line couplers.

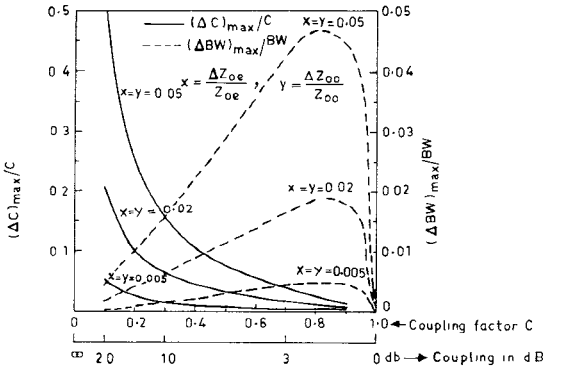

Fig. 2. Fractional change in coupling and bandwidth of coupled TEM-line couplers caused by tolerances in Z_{0e} and Z_{0o}.

5) The last line before Section II-D on page 790 (right column) should read as "2 percent for a 2-percent deviation in impedances."

6) The value of $(\Delta BW)_{\max}/BW$ in the seventh line of Section II-E on page 790 (right column) should be 0.018 and not 0.011.

Correction to "Coupling of Waveguides Through Large Apertures"

V. M. PANDHARIPANDE AND B. N. DAS

In the above paper[1], expression (13) on page 211 should read as

$$C\ \mathrm{dB}=20\log\frac{1/\bar{B}}{2|1+j/\bar{B}|}+8.686\alpha t.$$

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The authors are with Department of Electronics and Electrical Communication Engineering, Indian Institute of Technology, Kharagpur 721302, India.
[1]V. M. Pandharipande and B. N. Das, "Coupling of waveguides through large apertures," *IEEE Trans. Microwave Theory Tech.*, vol. MTT-26, pp. 209–212, Mar. 1978.

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