Comments on "Realization of an All-Pass Transfer Function Using the Second Generation Current Conveyor"

AHMED M. SOLIMAN

Abstract—It is pointed out that an error exists in the circuit given in the above letter[1]. In correcting the circuit, it becomes identical to the general configuration previously described in the literature [1]. The realization of a first-order all-pass transfer function should not be compared with that of a second-order all-pass based on the number of circuit components.

In the above letter, Salawu has proposed a circuit which uses CC II and four impedances. According to the circuit as given in Fig. 1 and using (1), the result given in (2) is not correct. The correct equation should be

$$\frac{V_O}{V_i} = \frac{Z_2Z_3 - Z_1Z_4 - Z_1Z_3}{Z_2Z_3 + Z_1Z_2 - Z_1Z_3}.$$

To correct this error and to obtain (2) as given in the above letter, the terminals x and y of the CC II should be interchanged (or (1) should be corrected by interchanging x and y in all positions). In this case, the circuit becomes identical to the general circuit described over seven years ago by this author [1]. Now (2) of the above letter becomes the same as (2) of [1] (with Z_1 and Z_2 interchanged).

The realization of a first-order all-pass transfer function can be easily obtained, as given in Fig. 2 of the above letter (after the terminals x and y are interchanged). Another first-order all-pass realization is possible by taking Z_1 as a capacitor and Z_3 as a resistor. The grounded C circuit has a positive dc gain factor, where as the floating C circuit has a negative dc gain factor. It is clear that the first-order all-pass network in the above letter adjusts the phase from 0 to π only, whereas the second-order all-pass network [1] adjusts the phase from 0 to 2π. Thus it is obvious that a first-order all-pass network uses fewer circuit components than the second-order all pass. At this point, it is noted that the second-order all-pass networks reported in [1] are canonic. As far as the gain factor is considered, the circuit proposed in Fig. 2(b) in [1] has a unity gain factor.

Reference

[1] A. M. Soliman, "Inductorless realization of an all-pass transfer function using the current conveyor," *IEEE Trans. Circuit Theory*, vol. CT-20, pp. 80–81, Jan. 1973.

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[1] R. I. Salawu, *Proc. IEEE*, vol. 68, pp. 183–184, Jan. 1980.

Comments on "Computer Generation of Correlated Gaussian Random Variables"

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We were very pleased to read the above letter[1]. The problem of generation of good quality Gaussian pseudorandom numbers with the prescribed correlation function is a very important one.

But it seems to us that the Geist's method is not efficient enough because it provides reducing of computation only for strong correlated numbers by means of pruning the diagonal matrix of the eigenvalues. As early as in 1972, we described [1] a method which is much more accurate and fast, and converts the sequence of independent numbers having practically arbitrary probability distribution directly to the sequence of properly correlated Gaussian numbers.

The length N of this resulting sequence is not less than the length of the initial one and the number of operations is proportional to $N \log N$, which means that the quantity of initial pseudorandom numbers per one output Gaussian number is not more then 1 and the number of operations per one Gaussian number is proportional to $\log_2 N$ (compare with Geist's method, where quantity of p operations per one output number is proportional to the quantity of nonzero eigenvalues of the diagonalized correlation matrix).

The method is based on the calculation by the fast-Fourier transform (FFT) algorithm the discrete Fourier transform (DFT) of the sequence of independent pseudorandom numbers $\{z_k\}$ weighted by the samples $\{z_k\}$ of the required power spectrum (DFT of correlation function)

$$\rho_n = \frac{1}{\sqrt{N}} \sum_{k=0}^{N-1} \alpha_k z_k \exp\left(-i\frac{2\pi nk}{N}\right), \quad n = 0, 1, 2, \cdots, N-1.$$

It is shown in [1], that multidimensional probability distribution of $\{\rho_n\}$ goes to the Gaussian one and the correlation function is defined by the relation

$$R(\rho_n\rho_m) = \frac{\overline{|z_k|^2}}{N} \sum_{k=0}^{N-1} |\alpha_k|^2 \cos\left[2\pi\frac{(n-m)k}{N}\right].$$

Finally, we would like to mention that because N is large enough in practice, the quality of approximation of Gaussian distribution is very perfect; in fact, it may be most perfect among the other known methods of generation of pseudo-Gaussian numbers.

Reference

[1] L. I. Mirkin, M. A. Rabinovitch, and L. P. Jaroslavski, "Method of generating the correlated Gaussian pseudorandom numbers in computers," *J. Computational Math. Mathematical Phys.*, vol. 12, no. 5, p. 1353, 1972 (in Russian).

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[1] J. M. Geist, *Proc. IEEE*, vol. 67, p. 682, May 1979.

A Note on Spectral Shaping of Minimum-Shift-Keying-Type Signals

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Abstract—Recently proposed minimum-shift-keying (MSK)-type modulation schemes are shown to be members of a previously suggested class of offset quadrature-carrier modulation techniques called continuous-shift-keying (CSK).

I. Introduction

The search for spectrally efficient modulation techniques with constant envelope and good error performance led to the development of minimum-shift-keying (MSK) and a large number of MSK-type modulation schemes.

MSK is a form of offset quadrature-carrier modulation with sinusoidal pulse shaping. This pulse shaping induces phase continuity at bit transition times, and as a consequence the spectral sidebands fall off more rapidly than for binary phase-shift-keying (BPSK) or even for quadrature

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