A Review Paper Based on the Application of CDBA

Rajesh Kumar Dubey[1] Mis.Jigyasha Maru[2]
[1]Research Student[4]Assistant Professor
[1,2]Department of Electronic and Communication Engineering
[1,2]Dr.C.V.Raman University,C.G., Bilaspur

Abstract— In this review paper various current processing applications using current differencing buffered amplifier has been studied. Also the CMOS realization of the current differencing buffer amplifier (CDBA) shown. The circuit shown in the paper is for different applications. Results for application are verified on simulation tool but here only circuits have been shown.

Key words: CDBA, Oscillator, Filter etc

I. INTRODUCTION

The very large scale integration (VLSI) technology development, along with the never decreasing demand for a completely integrated systems which contain a larger number of digital as well as analog circuits on a single chip and has also ensured continuous interest on analog circuit design which have to be compatible with CMOS technology. In fact, analog circuits like continuous time filters, sinusoidal oscillators, digital to analog (D/A) and analog to digital (A/D) converters, voltage comparators, current and voltage amplifiers, rectifiers, etc. are unavoidable analog circuits that cannot be used by any other digital techniques. Analog circuit design has historically been viewed as a voltage controlled form of signal processing. However, current-mode analog circuits have emerged in the recent years. In current- mode circuit description, the input and the output are both taken in the current form rather than in voltage form. In contrast to the voltage mode circuits, the current mode circuits can exhibit, under certain conditions, higher bandwidth and better signal linearity .Since they are designed for lower voltage swings, small voltage supplies can be used. In addition to the advancement in current-mode analog signal processing, another particular development is the growth of new current-mode analog building blocks among which the most popular has been the current conveyor (CC) circuit.

In this review paper, a new improvised CMOS configuration of CDBA is by providing low input impedances at the two terminals p and n, very high output impedance at port z, a good linearity and high input/output gain ratio for current transfer. The CDBA contains only MOS transistors and is designed to work in CMOS technology. To demonstrate the performance of the CDBA circuit, various current processing design has been considered. The next sections include the PSPICE simulations filter characteristics and the oscillator characteristic. The simulations show that the proposed CDBA circuit exhibits high Performance and the output obtained for the filter are in complete agreement with theory.

II. CIRCUIT DESCRIPTION OF CDBA

The circuit symbol of the CDBA is shown in Figure a, b, where p and n are the positive and negative current input terminals, respectively, z is the current output terminal, and w is the voltage output terminal. Its current and voltage characteristics can be described by the matrix shown below. Here we have.

$$\begin{bmatrix} I_z \\ V_w \\ V_p \\ V_n \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} V_z \\ I_w \\ I_p \\ I_n \end{bmatrix}$$

Fig. 1: CDBA matrix

$V_p = V_n$, $I_z = I_p - I_n$ and $V_w = V_z$

According to the above set of describing equations depicted by the Matrix, the terminal z behaves as a current source that takes the difference of currents at the inputs, and the terminal w behaves as a voltage source that copies the output voltage at the z terminal The circuit symbol of the current differencing buffered amplifier (CDBA) is shown in Fig. 1a,Where p and n are input, w and z are output terminals. The equivalent circuit CDBA gave blow.

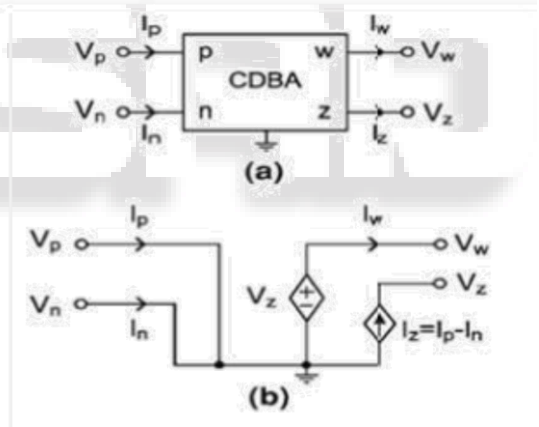

Fig. 1: a,b shows the CDBA model

Ideal current and voltage characteristics of the CDBA can be Describedby:

Vp = 0, Vn = 0, Iz = Ip −In, Vw = Vz.

Note that the input terminals, through which ip and in flows, are internallygrounded, where ideally the input impedance of the terminals pand n are internally zero.

III. LITERATURE SURVEY

Sheik ajaj proposes a new Voltage-mode three inputs and Single output (TISO) multifunction filter based on single CDBA, four resistors and two capacitors. This second order filter circuit is capable of implementing multiple filter functions by choosing values of the three variable inputs. The natural frequency (ω0) is tuned with passive components and the Q of the circuit is independent of (ω0). The higher cascading capability of the circuit is ensured because of its low-output impedance.

The proposed circuit is able to implement Low Pass, High Pass, Band Pass, All Pass and Notch Filters as well. Besides employing a singleCDBA, there are four resistive and two reactive components in the circuit. Further incase.

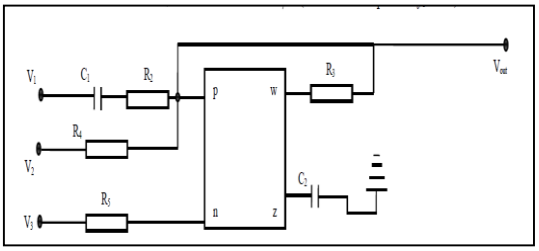

Fig. 2: TISO circuit

of proposed circuit Q is independent of ($\omega 0$) and can be changed by simply changing the value of $R4$ only. The tuning of filter *i.e* changing the value of ($\omega 0$) is possible by changing the value of passive components $R2$ and $R3$ in the circuit [1].

In Firat's work, A first order all-pass filter circuit using current differencing buffer amplifier (CDBA) in the low voltage is presented. The circuit is suitable for CMOS implementation. The circuit is chosen as an application example to demonstrate the performance of the CDBA.

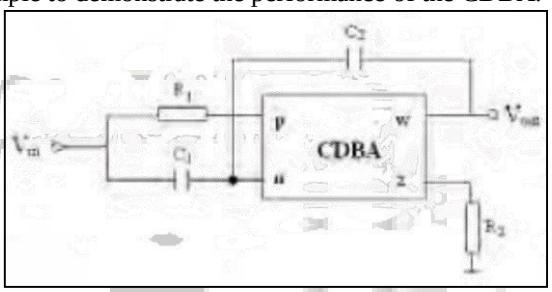

Fig. 3: First order all-pass filter circuit using

CDBA, current differencing buffered amplifier, is a multi-terminal active component with two inputs and two outputs. The CDBA is simplifying the implementation by freeing it from parasitic capacitances and it is able to operate in the frequency range of more than hundreds of MHz. All-pass filters are one of the most important building blocks of many analog signal-processing applications and therefore have received much attention. They are generally used for introducing a frequency dependent delay while keeping the amplitude of the input signal constant over the desired frequency range [2].

Sadri, Hakan proposed a new active building block, CDBA: current differencing buffered amplifier is introduced to provide new possibilities in the circuit designing and to simplify the implementation. The main aim of this paper is to present a CDBA-based multipurpose filter topology which realizes LP, BP, and HP transfer functions simultaneously. The performance of the circuit has been tested experimentally by using thebipolar realization of the CDBA.

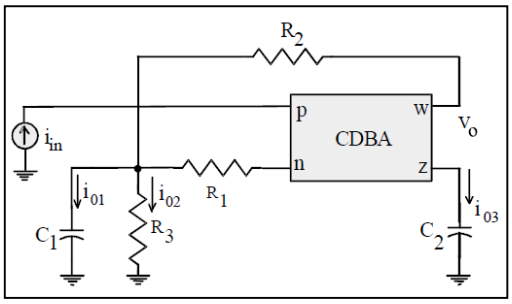

Fig. 4: CDBA based multipurpose filter

In this work a new CDBA based multipurpose filter is shown. The basic filter cell is a dual-function filter realizing LP and BP transfer functions. For this realization the matching of any element is not necessary. The independent adjustment of Qis permitted in filters to exhibit a low input impedance and an appreciable large signal behavior. The low input impedance provided by the active element, CDBA, the proposed filter topology can be easily cascaded by connecting the terminal of the corresponding element to the input of the next stage of filter [3].

Shudhanshu Maheshwari presents two new first-order voltage-mode all-pass filters using a single-current differencing buffered amplifier and four passive components. Each circuit is compatible to a current-controlled current differencing buffered amplifier with only two passive elements, thus resulting in two more circuits, which uses a capacitor, a resistor, and an active element, thus using minimum number of active and passive components. The proposed circuits possess low output impedance, and hence can be easily cascaded for voltage-controlled systems

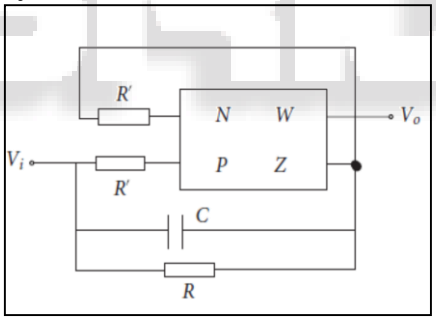

Fig. 5:(a)

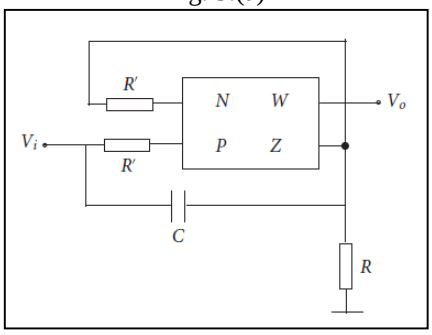

Fig. 5:(b)

Fig. 5:(a) and (b) first-order voltage-mode all-pass filters

The proposed circuits were simulated using PSPICE simulations using the CCCDBA of with a supply voltage of ±2.5V. The VT is taken to be 26mV, the value at room temperature. The design varies with change in operating temperature. However, it cannot be taken as a drawback, as the designer has a control over the circuit's parameters through the bias current (Io) [4].

IV. CONCLUSION

Form the above study we have concluded that the CDBA, current differencing buffered amplifier, is a four terminal active component with two inputs and two outputs. The CDBA is simplifying the implementation, free from parasitic capacitances and it is able to operate in the frequency range of more than hundreds of MHz. characteristics are in good agreement with theory CDBA is used to design the various current generation and current processing applications.

REFERENCES

[1] Sheikh Ajaz Bashir*, Nisar Ahmed Shah," Voltage Mode Universal Filter Using Current Differencing Buffered Amplifier as an Active Device". Circuits and Systems, 2012, 3, 278-281, 10.4236/cs.2012.33038 Published Online July 2012

[2] Fırat Kaçar1, Serdar Menekay2,"Realization of a CMOS Current Differencing Buffer Amplifier and Its Filter Application," ELECO 2011 7th International Conference on Electrical and Electronics Engineering, 1-4 December, Bursa, TURKEY.

[3] Sadri Özcan, Hakan Kuntman and O˘guzhan Çiçeko˘glu," Cascadable Current Mode multipurpose Filters Employing Current Differencing Buffered Amplifier (CDBA)," Int. J. Electron. Commun. (AE¨ U) 56 (2002) No. 2, 67−72

[4] Sudhanshu Maheshwari," Voltage-Mode All-Pass Filters Including Minimum Component Count Circuits," Hindawi Publishing Corporation Active and Passive Electronic Components Volume 2007, Article ID 79159, 5 pages doi:10.1155/2007/79159.

[5] H. O. Elwan, A. M. Soliman, "Novel CMOS differential voltage current conveyor and its applications", IEEProceedings, pp. 195–200, 1997.

[6] W. Chiu, S. I. Liu, H. W. Tsao, J. J. Chen, "CMOS differential difference current conveyors and theirapplications", IEE Proceedings, pp. 91–96, 1996.

[7] A. Fabre, "3rd-generation current conveyor – a new helpful active element", Electronics Letters, vol. 31, pp. 338–339,1995

[8] Amit Bhanwal, mayank kumar, Yogendera kumar," FPGA based Design of Low Power Reconfigurable Router for Network on Chip (NoC)", ISBN:978-1-4799-8890 ©2015 IEEE,International Conference on Computing, Communication and Automation (ICCCA2015).

[9] Madhuraj, prince kumar pandey, mayank kumar,"FPGA Implementation of Convolution using Wallace Tree Multiplier," International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV3IS061634, Vol. 3 Issue 6, June – 2014.

[10] Mayank kumar, meharban singh, rajiv Kapoor,"Area & Dynamic Power Optimization of CMOS 1-Bit Full Adder Using Genetic Algorithm," International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV3IS061634, Vol. 3 Issue 5, may – 2014.

[11] Akash Kumar1 Mayank Kumar2 Varun Kuma r3 Sushant Shama4." Design of a Single Precision Floating Point Unit in Verilog," IJSRD - International Journal for Scientific Research & Development| Vol. 2, Issue 03, 2014 | ISSN (online): 2321-0613.

