Design & Simulation of Multiphase Oscillator using CCCII

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***Abstract*- In this work two different topology of multiphase oscillator are designed using second generation current controlled current conveyor (CCCII) as active block. In this work a multiphase Oscillators (MPO) is proposed. The technique can be used to generate multi-phase, different waves shape, low distortion sine waves. Active multiphase oscillator designed in current controlled current conveyor (CCCII) technology has been new idea for VLSI technology. In first circuit three CCCII and three capacitors are used and in second circuit three CCCII, three register and capacitors are used.**

Keywords- Analog integrated circuits, Current conveyors, MOS-C realization, Quadrature sinusoidal oscillators

I. INTRODUCTION

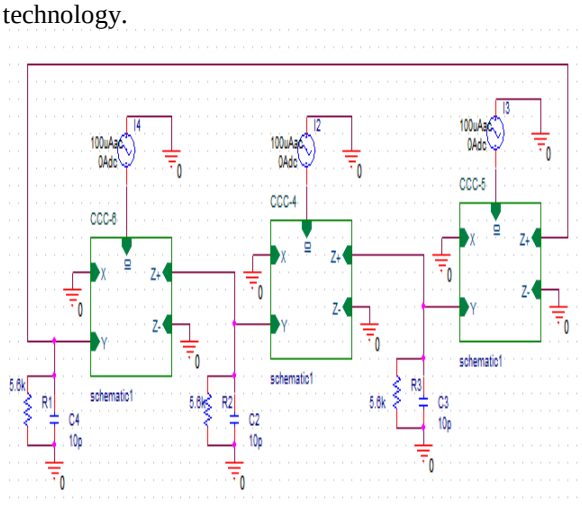
The concept of integrated circuit was first wired by a physicist named G. W.A Dummer in 1952 and finally discovered by Jack Kilby in 1959 which coincide with the development of planner technology.

Everything near to us that we see, hear and sense in physical life is analog like our voice, music, audio and physical activity etc. Analog IC design becomes more familiar and popular in daily life like in our laptop, cellular phones, hearing aid, nanotechnology probes, unmanned aerial vehicles, robots, electronic gadgets etc. The improvement of integrated circuits (ICs) containing mixed analog and digital functions on a single silicon chip give a new approach for the analog designer. Recent advances in analog ICs design becomes "technology specific" due to the effective use of Metal oxide semiconductor field effect transistors (MOSFETs), Bipolar junction transistors (BJTs), bipolar and complementary metal oxide semiconductor field effect devices (BiCMOS) and high speed Gallium Arsenide (GaAs) devices.

The available components for the analog circuit design is very less, they are generally transistors, resistors and capacitors. In integrated circuit transistors (both BJTs and MOSFETs) plays an important role for processing currents rather than voltages and acts as a current controlled output device. To enhance the performance of integrated circuit (IC) technology, the analog designers are bounded to use only active components. In analog IC design the device dimension is regularly decreases, which causes the voltage swing be also decreased. Decrement in the device dimension and voltage do not hamper the design of high performance analog integrated circuits. Several new current mode analog building blocks are: first generation current conveyor (CCI) second generation current conveyor (CCII), third generation current conveyor (CCIII), dual output/multiple output current conveyor (DOCCII/MOCCII), second generation current controlled current conveyor (CCCII) , differential voltage current conveyor (DVCC), differential difference current conveyor (DDCC), inverting current conveyor (ICCII), universal current conveyor (UCC), fully differential current conveyor (FDCC), operational trans-conductance amplifier (OTA) etc. To construct the internal structure of the above analog building blocks current mirror is used. Current mirror exactly reproduces the current existing originally in the circuit. This behavior is used as a powerful technique for biasing the transistors within the integrated circuits apart from that the same current source and sink may be used as a dynamic ac resistance. The rest of the paper is organized as follows. Section II outlines Essential Characteristics Cloud Platform. Cloud Service Platform explains in Section III. The Proposed Methodology is analyzed in Section V. The conclusions are given in Section VI.

II. DESIGN OF MULTIPHASE OSCILLATOR

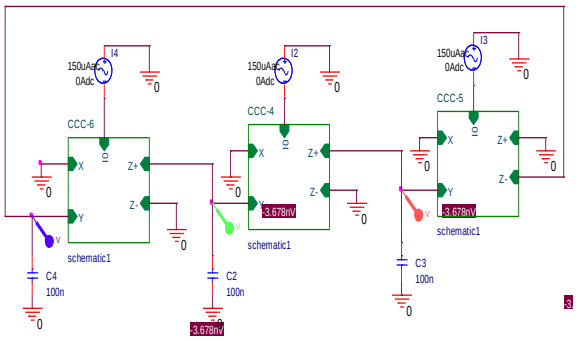
In this work two different topology of multi phase oscillator are designed using second generation current controlled current conveyor (CCCII) as active block. In this work a multi Phase Oscillators (MPO) is proposed. The technique can be used to generate multi-phase, different waves shape, low distortion sine waves. Active multiphase oscillator designed in current controlled current conveyor (CCCII) technology has been new idea for VLSI technology.



In first circuit three CCCII and three capacitors are used and in second circuit three CCCII, three register and capacitors are used.

In next step, we replace active block of second generation current controlled current conveyor (CCCII). The first circuit based on three CCCII and three capacitors are shown in fig. 4.1 in this topology three CCCII, three resisters and capacitors are used. For the implementation of oscillator circuit required only single CCCII as the active element for each phase without any additional current amplifiers. Here X terminal has connected to the grounded and parallel combination of register and capacitor are connected to the Y terminal and Y terminal is connected to the Z terminal of last active block used as a feedback and provided a feedback gain to follow the Barkhausen Criteria AB = -1 where A is the forward gain and B is backward gain. It The required external phase shift has obtained with the positive feedback obtained for sustained un-damped oscillations. The starting block also the realization of even/odd-order multiphase sinusoidal oscillator is shown in Fig.4.2. It consists of three basic building blocks.

The first two blocks are identical, and each of these blocks uses a plus-type Z output CCCII with a grounded resistor and a grounded capacitor. The third block consists of a minus type Z-output CCCII with a grounded resistor and a capacitor. The third block provides an additional 180° phase shift. Each block of the scheme is characterized by the transfer function.



III. PERFORMANCE PARAMETER

a) Bias current I0
b) Power dissipation
c) Signal Mode
d) Independent control of OC and O

IV. SIMULATION RESULT

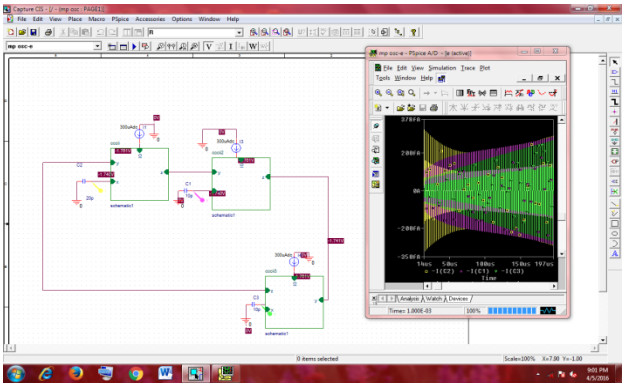
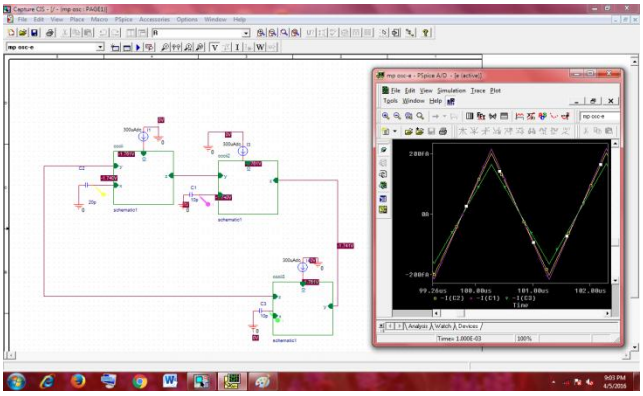


Figure 5.5.a Simulation result of multiphase oscillator output for $C_1 =$ 20pF, $C_2 = C_3 = C_4 =$ 10pF and bias current $I_0 = 300$ µA



V. CONCLUSION

1) In this work two structure of twomulti Phase Oscillators (MPO) have been proposed. The technique can be used to generate multi-phase, equally amplitude, low power consumption.The use of grounded capacitor and identical circuit configuration for each section in the MPO structure which is suitable for IC design.
2) The electronic tunability of both oscillation condition and oscillation frequency.
3) Independent tuning of the oscillation frequency and theoscillation condition.
4) Requirement for only three CCCII as the active element for each phase withoutany additional current amplifiers.
5) The technique can be used to generate multi-phase wave for same frequency (2.53 MHz), equally amplitude, and low power consumption (5.2m Watts)

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