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Generation Of Ask and Fsk from Digitally Controlled Cccii+ Oscillator

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ABSTRACT
This paper presents the of clocked oscillations using CCCII and generating amplitude shift keying and frequency shift keying with minimum voltage less than ±1.5V

KEY WORDS: *Clocked CCCII Oscillator, ASK (Amplitude Shift Keying), FSK (Frequency Shift Keying)*

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1. INTRODUCTION

Second generation current conveyor is a versatile building block which can realize a variety of current mode circuits. CMOS implementation of the CCCII± used to provide much less power consumption and minimum voltage/current. Therefore, a compression of voltage signal swing and a reduction of supply voltage are possible. Also, with very high values for the drain currents of the MOS, their maximum usable frequency will be reached sooner.

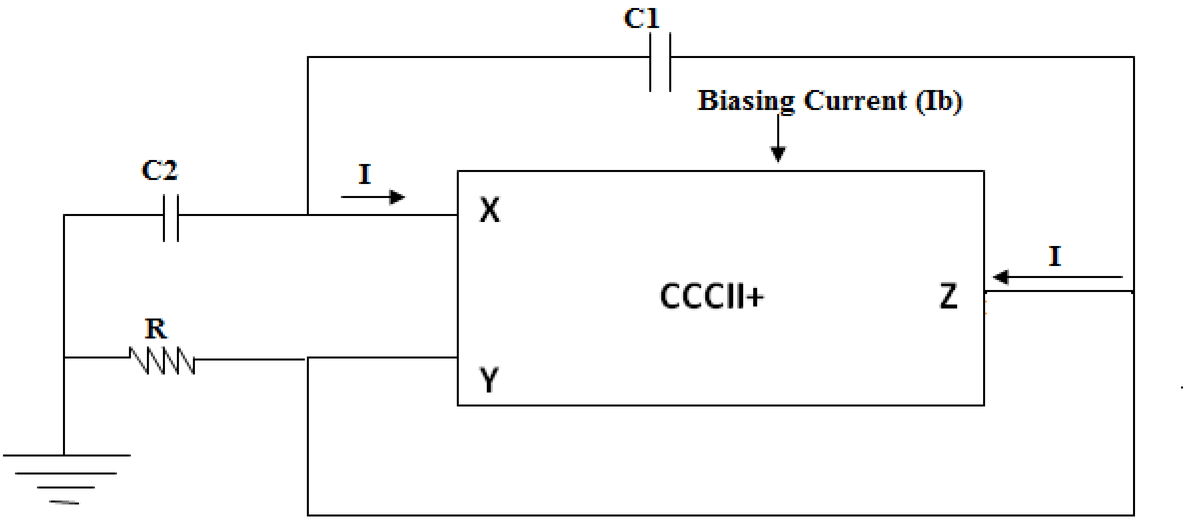

Fig 1: Block Diagram of Clocked CCCII+ Oscillator

The oscillators play an important role in analogue circuit design, because they are widely used in communication, signal processing and control systems. The negative impedance transformation properties of current conveyors make them a natural candidate for oscillator circuits. The first conveyor oscillator was proposed by in 1975 and was effectively limited to the audio frequency range, exhibition linked sustainability in the two conveyor form and also requiring extensive component matching in the single conveyor version. The fig 1, shows the CCCII based oscillator with C1=C2=10pf, R=5kΩ. The biasing current Ib=17uA, for which the frequency of oscillation is given as

$$\omega = \frac{1}{\sqrt{C1C2RxR4}}$$

Where: $R4 = \frac{(C1+C2)RX}{C2}$

According to the analysis, firstly biasing current is applied (un-clocked CCCII+) to get the desired oscillations, fig 2

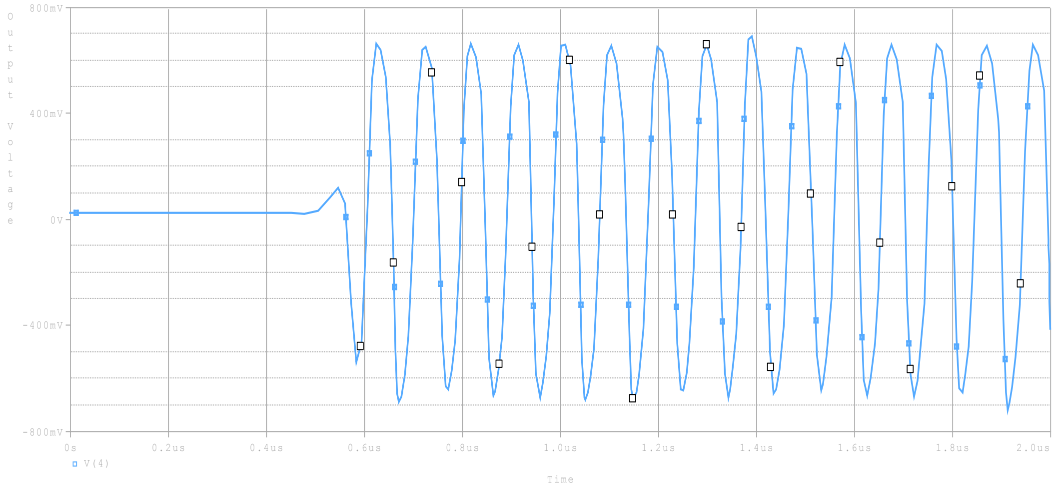

Fig.2: Simple Oscillations (un-clocked CCCII)

The above waveform is taken with respect to time for oscillations up-to 2u seconds. The frequency is found to be 11MHZ. It is clear that the maximum amplitude for above oscillations is 0.64V which is less than the supply voltage i.e ±1.5V, also the total harmonic distortion (THD) =28%. After generating the oscillations, a ***clocked biasing current*** is applied with a time period of 2us and the transitions occur up-to 4u seconds, fig 3

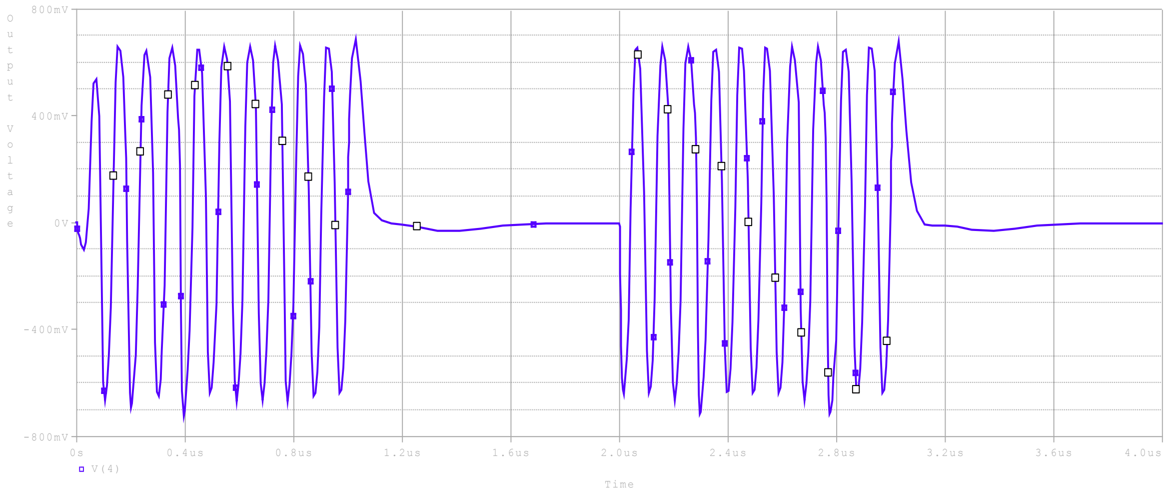

Fig 3: Clocked Oscillations

From the above oscillations it is predicted that the maximum output voltage is found to be same as when the oscillator was un-clocked i.e 0.64V . Therefore after applying a clock biasing current the oscillations are also occurring according to the clock with a biasing current of 17uA but now the total harmonic distortion (THD) increased 73%.

Modulation

It is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal which typically contains information to be transmitted.

Amplitude-Shift Keying (ASK)

ASK is a form of amplitude modulation that represents digital data as variations in the amplitude of a carrier wave. Any digital modulation scheme uses a finite number of distinct signals to represent digital data. ASK uses a finite number of amplitudes, each assigned a unique pattern of binary digits. Now according to the output of oscillator ASK signal is produced with a transition of clock form 0uA to 17uA, as in fig 3, there was a change of phase when second clock pulse was occurring. So in order to keep constant phase ASK signal is produced, fig 4

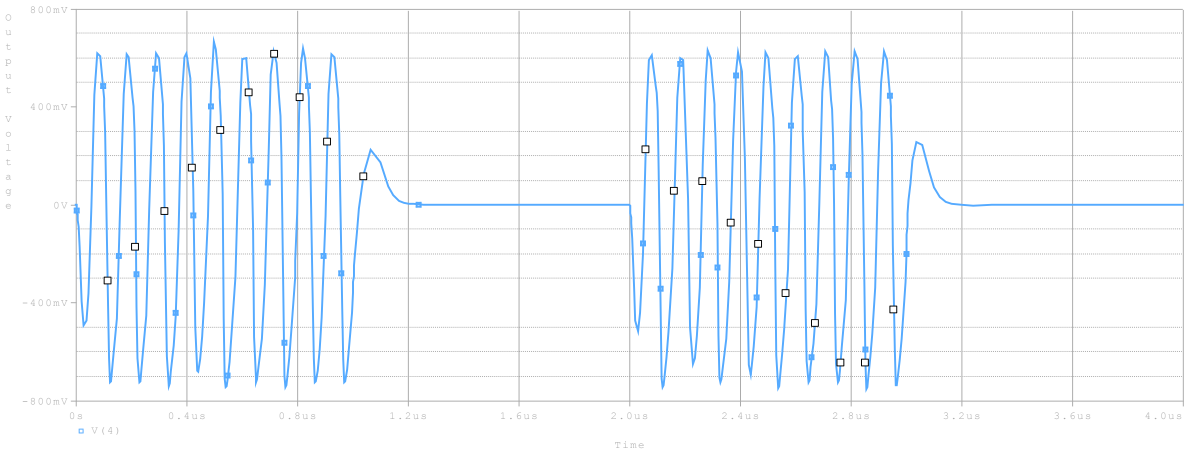

Fig 4: ASK Signal

Again for the above figure the amplitude remains constant i.e. 0.64V with an increased frequency of 20.78MHz which is much more than the un-clocked oscillations. THD=78%

4.2.1.2 Frequency Shift Keying (FSK)

FSK is a frequency modulation scheme in which digital information is transmitted through discrete frequency changes of a carrier wave. From fig 3-4, it can be said, for generating FSK signal the transition if a clock pulse is taken from 20uA to 60uA

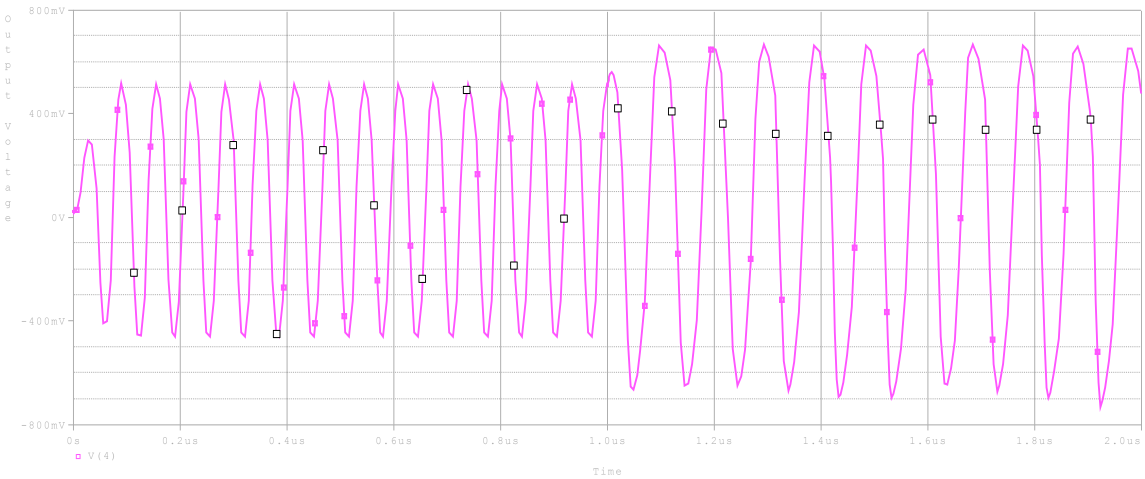

Fig 5: FSK Signal

From fig 5, there are two frequencies for each transition but still the amplitude is not fixed for the two transitions of clock pulses. So in order to keep the amplitude constant, biasing transistors length is varied to 0.7µm, fig 6. For the first clock the frequency is calculated to be 15MHz and for next clock pulse that is after 1µs the frequency is calculated to be 9.74MHz. THD=34%

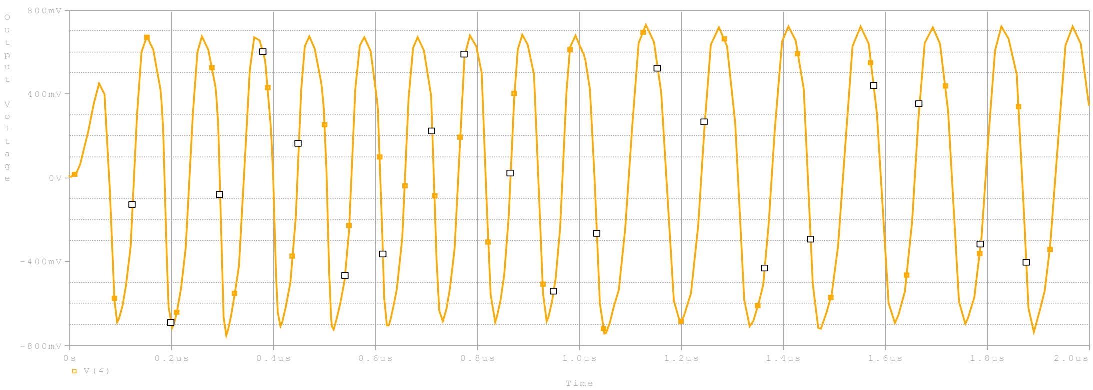

Fig 6: FSK with two different frequencies

II. CONCLUSION

This paper shows the comparison of clocked CCCII oscillations and the waveforms of ASK and FSK. With a biasing current of 17µA the THD of clocked oscillations is 73% with an oscillating frequency of 10.4MHz. For ASK the THD is increased to 78% but with a high frequency of 20.4MHz with a biasing current ranging from 20µA-60µA. So, in order to reduced the THD FSK technique is used due to which THD is reduced to 43% as the length of the biasing transistor is increased to 0.7µm. The output voltage is found to be 0.64V which is less than the applied voltage

Oscillations	**Biasing current**	**THD(Total Harmonic Distortion)**	**Frequency of Oscillation**
Clocked Oscillations	0-17µA	73%	10.4MHz
ASK	17µA	78%	20.78MHz
FSK	20µA-60µA	34%	20.78Mz

Table 1: Conclusion

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