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Title of the Thesis: “Realization of Some Voltage and Current Mode Signal Processing /Signal Generating Circuits using State of Art Analog Building Blocks and Their Applications”

Abstract

Keywords: *Analog Building Blocks(ABB), Current Follower Trans-conductance Amplifier(CFTA), Analog Signal Processing(ASP), Current Feedback Operational Amplifier(CFA), Operational Amplifier(Op-Amp),etc.*

A considerable amount of research work has been carried out in recent past and is continuing with accelerated pace at present in analog signal processing. Many new schemes and model for new analog devices are being suggested in the literature frequently. With the availability of powerful and reliable simulation software, the testing and prediction of the performance of circuits using these devices have become easy. The most frequently used analog signal processing devices are operational trans-conductance amplifiers (OTAs) [23-41], current feedback amplifiers (CFAs) [6-18], current conveyors (CCs) [42-65], four terminal floating nullors (FTFNs)[73-75], current differencing buffered amplifiers (CDBAs) [82-93], current followers (CFs), current follower trans-conductance amplifiers (CFTAs)[128-150], and voltage differencing trans-conductance amplifiers (VDTAs) [151-155] are widely used in realization of analog signal processing, wave shaping, multiphase and quadrature sinusoidal oscillators, integrators, differentiators, and precision rectifiers. Major portion of research has been devoted to analog signal processing and waveform generation using these devices. Biquadratic and high order filters in voltage and current-mode, forms the largest chunk of literature.

In this thesis the “Realization of some voltage and current mode signal processing/signal generating circuits using state of art analog building blocks and their applications” has been carried out. This includes various Analog Building Blocks (ABBs) such as Current Feedback Operational Amplifier (CFOA), Current Follower Trans-conductance Amplifier (CFTA), Voltage

Differencing Trans-conductance Amplifier (VDTA), Current Differencing Trans-conductance Amplifier (CDTA), Current Conveyor (CC-I, CC-II), etc. The main intention of this thesis is to investigate novel techniques for design of biquad filters and multiphase sinusoidal oscillators and quadrature oscillators using the latest advanced analog signal processing blocks (ABBs). Although a large variety of analog signal processing circuits have been used in the earlier literature, we have focused on three of the most versatile, latest and advanced building blocks namely, the Current Feedback Operational Amplifiers (CFOAs), Current Follower Trans-conductance Amplifiers (CFTAs), Voltage Differencing Trans-conductance Amplifiers (VDTAs). follower trans-conductance amplifier based circuits are attractive because they provide the facility .In chapter 1 we have introduced various analog signal processing building blocks. We have designed filters and oscillators using CFTAs, CFAs, and VDTAs. So, our main emphasis is on these ABBs. There are many analog designers who are working on these devices. So, day by day new ABBs come into picture. Also, new circuits based on these devices changing the world of integrated circuit and our present day lives.

In chapter 2 the detailed internal circuit diagram of the various ABBs are proposed along with their input/output relationship, symbol and equivalent representation is discussed in detail. In this chapter we have covered almost all the advanced analog building blocks along with our ABBs used in this thesis. This descriptive discussion will help in understanding the operation of these devices. Also, this will help to get the brief idea of this thesis.

In chapter 3 we have discussed the literature of analog signal processing which is published so far along with their realization using transistor and using CMOS. The analog designers have done a lot of research work in CFOAs, CCI, CC-II, CC-III, CDBA, CDTA, CFTA, VDTA, etc. Various oscillators and filters are designed using these devices.

In chapter-4& 5 we have proposed various current-mode filters using CFTAs and CFAs. New configurations for universal filters using CFTAs and CFAs are proposed. So, multifunction current-mode filters using CFTAs and CFAs are also included in this chapter along with their simulation results.

In chapter-6 we have finally concluded the thesis work along with its future scope in the area of analog signal processing.