CHAPTER 60

TECHNOLOGY
ELECTRONICS & COMMUNICATION
ENGINEERING

Doctoral Theses

01. AGARWAL (Meenakshi)
Some Investigation into VLSI Implementation of Digital Filters.
Supervisor: Dr. Tarun Kumar Rawat
Th 23700

Abstract
(Not Verified)

This thesis is concerned with the design and implementation of different structures of digitalfilters. These filters are characterized by their coefficients. Digital filters are widely classified asa finite impulse response filter (FIR) and infinite impulse response (IIR) filters. A mimicstructure of recursive digital filters is Wave digital filter (WDF). The idea of WDF is to digitizean analog circuit containing resistance, capacitance, inductance and transformers etc. WDFsovercome the limitations of the IIR filters like sensitivity to word length and coefficient round offerrors which makes IIR filter implementation tricky. A specific class of wave digital filters that issuitable for VLSI implementation is a lattice wave digital filter (LWDF). It consists of a parallelconnection of two allpass filter branches whose output are summed to produce the filteroutput. The advantages of WDFs are low sensitivity to coefficient quantization, stability underfinitearithmetic conditions and lower arithmetic complexity. These are attractive for VLSIimplementation due to minimal hardware requirements. The primary novel feature of thisthesis, is the realization and efficient implementation of fixed coefficient, high speed latticewave digital filter and lattice wave digital comb filter (LWDCF). The filters' performance isimproved in terms of delay or speed, hardware utilization or area and power dissipation ofdigital filters. In a recursive structure, the maximum sampling frequency is bounded. In thiswork, the maximum sampling frequency is focused to improve. The filters with high maximumsampling frequency are suitable candidates of low power and high speed applications. Thereason is that if required sampling rate is less than the maximum sampling rate, the excessspeed can be utilized to reduce the power consumption via power supply voltage scalingtechniques. Broadly, in this thesis, two problems are treated based on this idea.

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reprints.Appendix.Calculation of two port adaptor coefficients. The transfer function of three port adaptor allpass sections.

02. KUMAR GAUTAM

Study and Implementation of Unitary Gates in Quantum Computation Using Schrodinger Dynamics.

Supervisor: Prof. Harish Parthsarthy and Dr. Tarun Kumar Rawat

Th 23738

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1. Introduction. Realization of commonly use quantum gates using perturbed harmonic oscillator 3. Realization of quantum gated based on three dimensional harmonic oscillator in a time varying electromagnetic field 4. Realization of the three – qubit quantum controlled gate based on matching Hermitian generators. Conclusions.List of publications. Bio-Data