ABSTRACT

Design of A Fast-Settling OTA for High Frequency

Switched-Capacitor Applications. (May 2002)

Jinki Park

B.S., Seoul National University

Co-Chairs of Advisory Committee: Dr. Jose Silva-Martinez

Dr. Aydin Karsilayan

The ever-growing technology has enabled switched-capacitor (SC) circuits to operate at the MHz frequency range. The equally increasing demand for high speed signal processing using SC technique dictates the need of high performance operational amplifiers (opamps). Low voltage and low poer operation, one of the main industrial trends, however, puts significant challenges to analog circuit designers. In current digital-dominant technology, CMOS devices have become more suitable for digital circuit design; they require lower operation voltage with threshold voltages decreasing relatively sluggish. Designers should still be able to design circuits with the same or better performance then circuits designed for larger power supplies. As more and more building blocks and systems are getting integrated into smaller area, they still must be designed to achieve the needs of portable, lighter and reliable product.

In this thesis, characteristics of low voltage and low power SC circuits for high frequency applications are investigated. Several candidates of opamp architecture are compared in light of limitations aforementioned and design issues of selected topology are to be further examined. The proposed solution is designed at transistor level in Hewlett Packard 0.5 μm digital CMOS technology. As a test bench, a SC biquad band pass filter with sampling frequency of up to 120 MHz and center frequency of 20 MHz is designed

and fabricated through MOSIS. Test results of fabricated IC’s are presented and the validity of this research is accordingly justified.