

Design of Low Voltage Folded Cascode Operational Transconductance Amplifier with Optimum Range of Gain and GBW in 0.18 μ m Technology

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Abstract- An optimum OTA topology is done in order to optimize MOS transistor sizing. Also, the design of Folded Cascode OTA, which works for frequencies that lead to a baseband circuit design for RF application, is based on transistor sizing methodology. Simulation results are performed using CADENCE software and virtuoso spectre model for CMOS 0.18 μ m process technology. BSIM3V3 model simulator show that the designed folded cascode OTA has a 80.5dB DC gain and provides a gain bandwidth product 4.52MHz.

Keywords- CMOS IC design, optimization, folded cascode OTA, gm/ID methodology, Wilson current mirror, Optimization.

INTRODUCTION

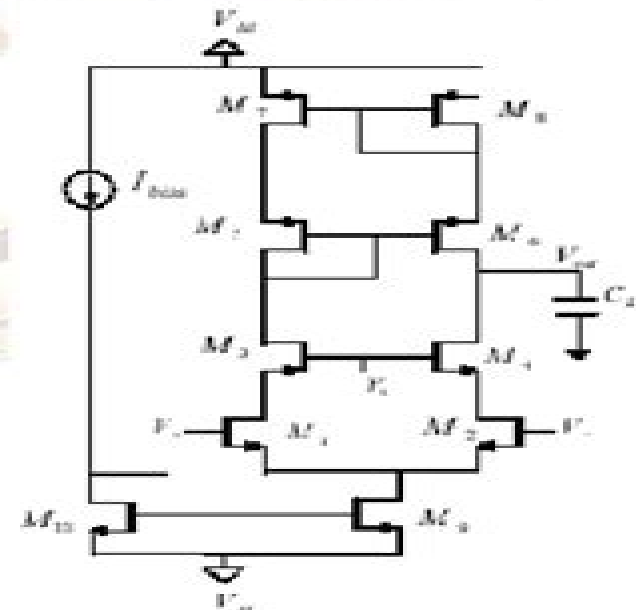
The evolution of the microelectronics industry is distinguished by the raising level of integration and complexity. It aims to decrease exponentially the minimum feature sizes used to design integrated circuits. The cost of design is a great problem to the continuation of this evolution. Senior designer's knowledge and skills are required to ensure a good analogue integrated circuit design. To fulfil the given requirements, the designer must choose the suitable circuit architecture, although different tools partially automating the topology synthesis appeared in the past [1]-[4]. The optimization becomes an important method; a heuristic process was developed in [5]. Designing high-performance baseband analog circuits is still a hard task toward reduced supply voltages and increased frequency. Current tendency focus on some radio-software receivers which suppose a RF signal conversion just after the antenna. Thus, a very higher sampling frequency and resolution analog-to-digital converter design is required. The Operational Transconductance Amplifier (OTA) is a basic element in this type of circuit whether switched capacitors technique is kept for ADC design. Our target was to design a folded cascode OTA circuit insight of Sigma Delta analog-to-digital converter design using for wide band radio applications.

This paper is organized as follows. An optimum Architecture of the folded cascode OTA was introduced in section II and its function was analyzed to extract the circuit performances. Section III describes an approach for designing this OTA, clarifies specific design issues, and results. While section IV provides concluding remarks.

II.OPTIMUM TOPOLOGY OTA ARCHITECTURE

Several fundamental issues exist when selecting an optimal architecture for the operational transconductance amplifier. This choice aimed both at large gain and large bandwidth performances. In order to achieve high gain, the differential telescopic topologies can be used. This topology cascade both the differential pair transistors and current mirror to increase load resistance (Fig.1)[6].

The telescopic architecture is a better candidate for a low power consumption and low noise OTA. [7] The performance of simple OTA is limited by its input and output voltage swing. To overcome these limits of simple OTA and have an improved performance a Folded Cascode OTA is used. Although, telescopic OTA has a limited



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LP Steffe

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