

Bin Huang
M.S.
Electrical Engineering
Major Professor: Degang Chen

Operational Amplifier Design and Compensation for Improved Efficiency in Gain Bandwidth Product and Slew Rate

ABSTRACT

This report reviews and compares the most widely used frequency compensation methods for operational amplifiers. In particular, we focus on the indirect compensation method, which has the potential to offer the improvement in gain bandwidth product and power consumption. The analytical expressions for the indirect compensation are included in the report to offer insights. A creative embedded low gain stage is proposed to improve the efficiency in bandwidth and slew rate. Based on the analysis, a two stage fully differential op amp is designed in AMI-0.5 μm process. The designed op amp achieved DC gain of larger than 100dB, unity gain frequency of 10MHz, slew rate of 6MHz while driving 1nF at each side with current consumption of 1mA. The amplifier achieved a higher simulated small-signal and large-signal figures-of-merit (FoMs) compared to some of the state-of-the-art amplifiers.