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Research Article

A Design and Simulation of Two-Stage Class-AB OTA with High DC Gain

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Abstract

In this paper, a new two-stage class AB operational transconductance amplifier circuit is proposed. By increasing the transconductance of the input transistors, the gain of the operational amplifier is improved and on the other hand, the reference noise of the input is reduced. Non-linear current mirrors have been used to improve the slew rate. By using these non-linear current sources, for an input signal with a large amplitude, the amount of output current increases proportionally to the fourth power of the input signal. Therefore, by using this structure, the slew rate of the operational amplifier is improved. In the proposed method, compensation is done in the form of a hybrid cascode, which was previously presented for a two-story structure. By using the proposed structure, other amplifier parameters such as unit gain bandwidth and stability are not damaged. The simulation results have been done in 0.18 micrometer technology and with 1.8V supply voltage in temperature corners and manufacturing technology using Cadence software. The simulation results show the better performance of the proposed operational amplifier compared to the existing structures. The value of DC gain of the proposed circuit after the post-placement simulation is equal to 93.5 dB. For this purpose, merit coefficients have also been used for comparison 1.8V supply voltage.

Keywords: Operational Trans-conductance Amplifier (OTA), DC-Gain, Input-Referred Noise, Unity Gain Bandwidth.

Highlights

- Proposing an operational amplifier with high DC gain without compromising other parameters such as unity gain bandwidth.
- Providing a solution to increase the transconductance of the input stage of the operational amplifier to increase its DC gain.
- Designing an operational amplifier with a high slew rate compared to existing structures.
- Increasing the coefficient of merit of the operational amplifier to evaluate its efficiency compared to existing structures.

Citation: [in Persian].