DTMOS Transistor with Self-Cascode Subcircuit for Achieving High Bandwidth in Analog Applications

Abstract

In this work, an improved dynamic threshold MOS (DTMOS) transistor with self-cascode subcircuit has been proposed in this work. By adopting the self-cascode subcircuit, the proposed DTMOS transistor could be operated at supply voltage over 0.7V. Apart from this, simulation results for the proposed DTMOS, also demonstrate improvement in the transconductance and bandwidth by a factor of 2.31 and 1.59 respectively. Furthermore, the current driving capability of proposed DTMOS transistor has increased by a factor of 1.87. To validate the proposed concept and its applications in analog circuits, a current mirror and a differential amplifier have been designed in 180nm CMOS technology. Both circuits are able to operate at higher bandwidth as compared to their conventional counterparts. The Monte Carlo simulations reflect the robustness of the circuits to device mismatch errors. The proposed DTMOS transistor is more suitable for large signal circuits such as mixer and voltage control oscillator.

References


Index Terms

Computer Science

Signal Processing
Keywords

Dynamic threshold MOS transistor (DTMOS), Self-Cascode, bandwidth, transconductance, analog integrated circuits.