Fully Differential Opamp Design

Common-mode Feedback Examples

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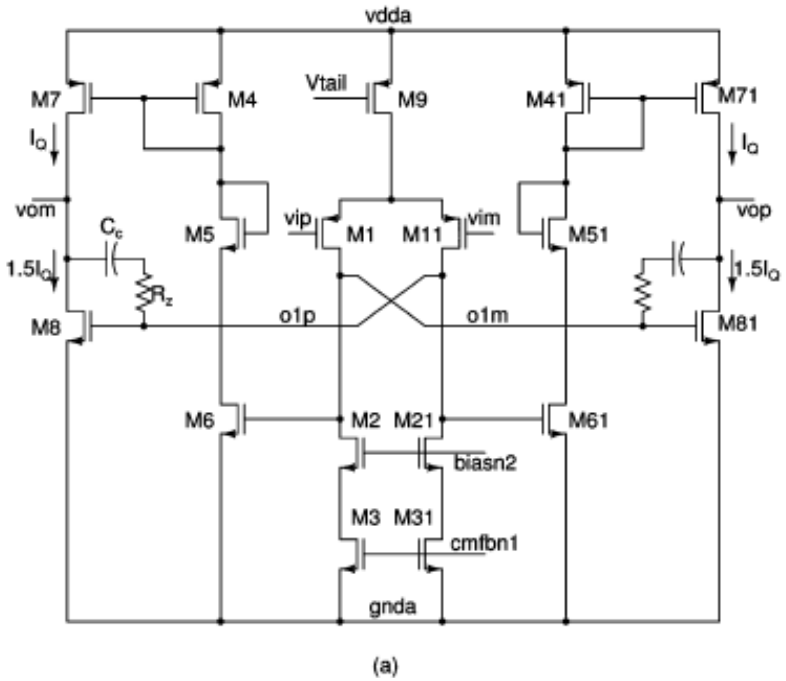
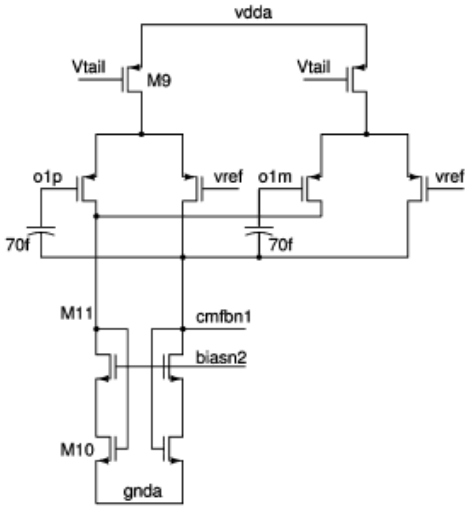
A Power Optimized Continuous-Time $\Delta\Sigma$ ADC for Audio Applications

Shanthi Pavan, Nagendra Krishnapura, Ramalingam Pandarinathan, and Prabu Sankar





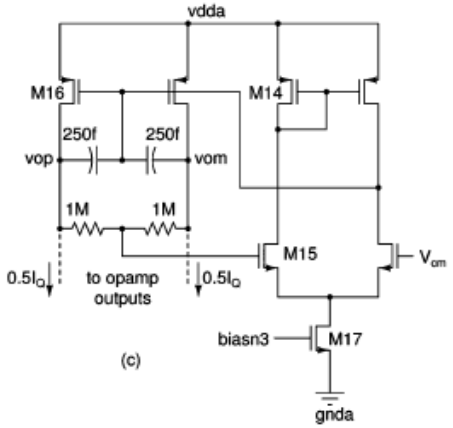


Fig. 8. Operational amplifier used in the first integrator. (a) Main amplifier. (b) Common-mode feedback (CMFB) for the first stage. (c) Second-stage CMFB circuit.

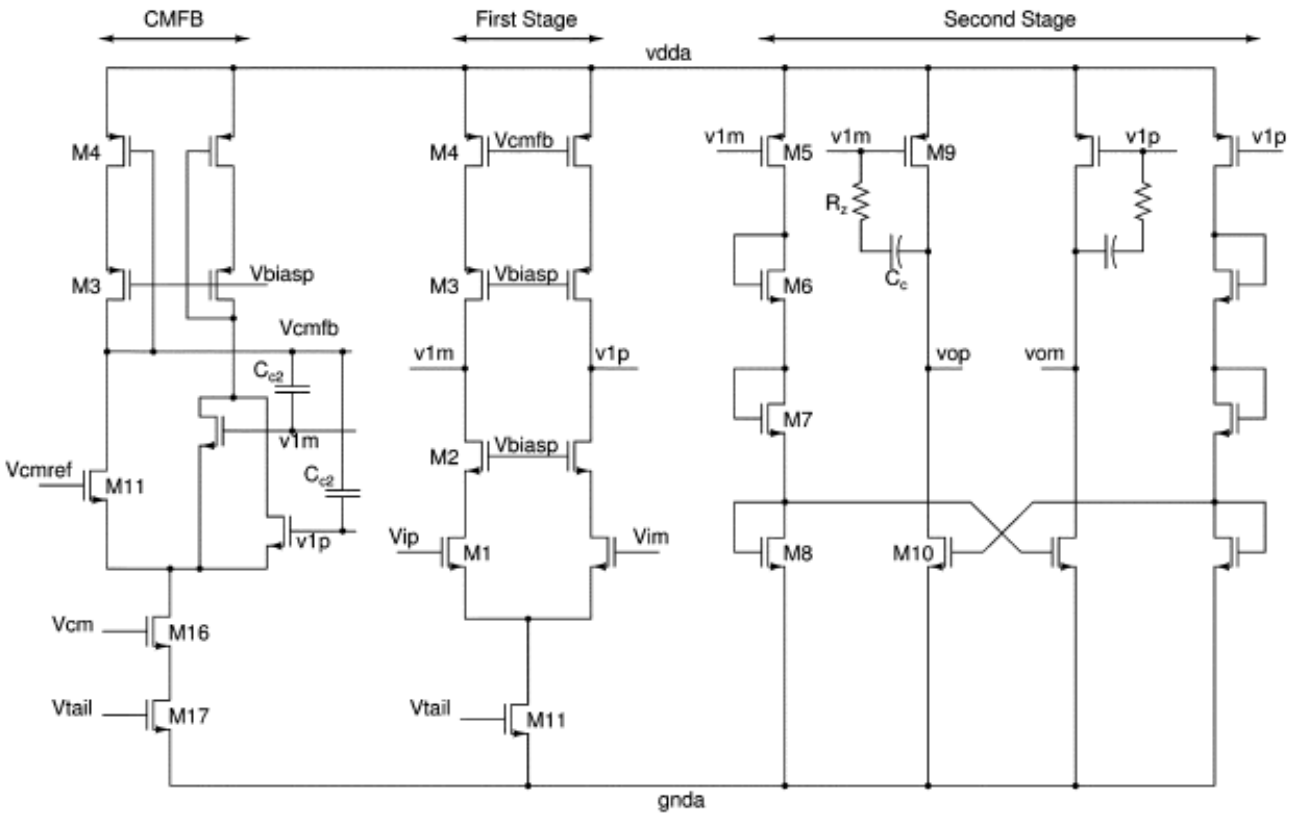


Fig. 9. Schematic of the operational amplifier used in the second and third integrators and the summing amplifier.

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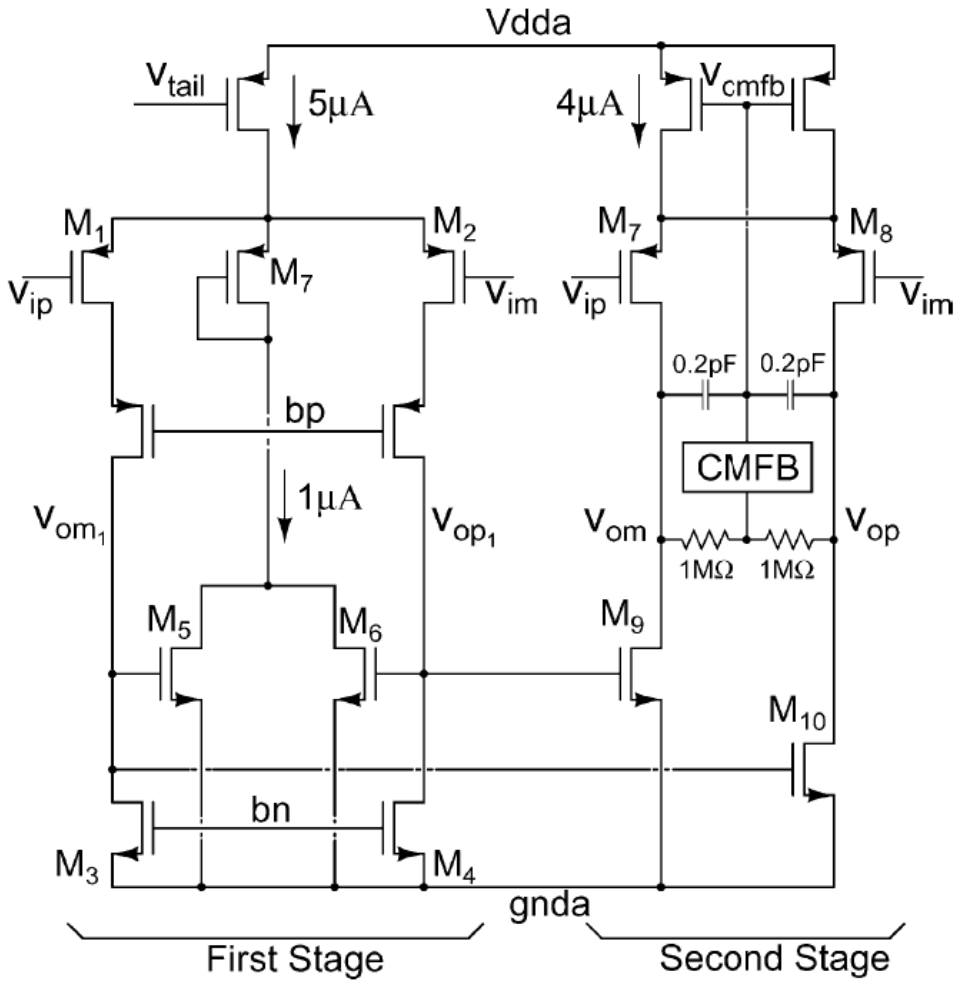
Power Reduction in Continuous-Time Delta-Sigma Modulators Using the Assisted Opamp Technique

Shanthi Pavan, *Member, IEEE*, and Prabu Sankar



A 16 MHz BW 75 dB DR CT ΔΣ ADC Compensated for More Than One Cycle Excess Loop Delay

Vikas Singh, Nagendra Krishnapura, Shanthi Pavan, Baradwaj Vigraham, Debasish Behera, and Nimit Nigania

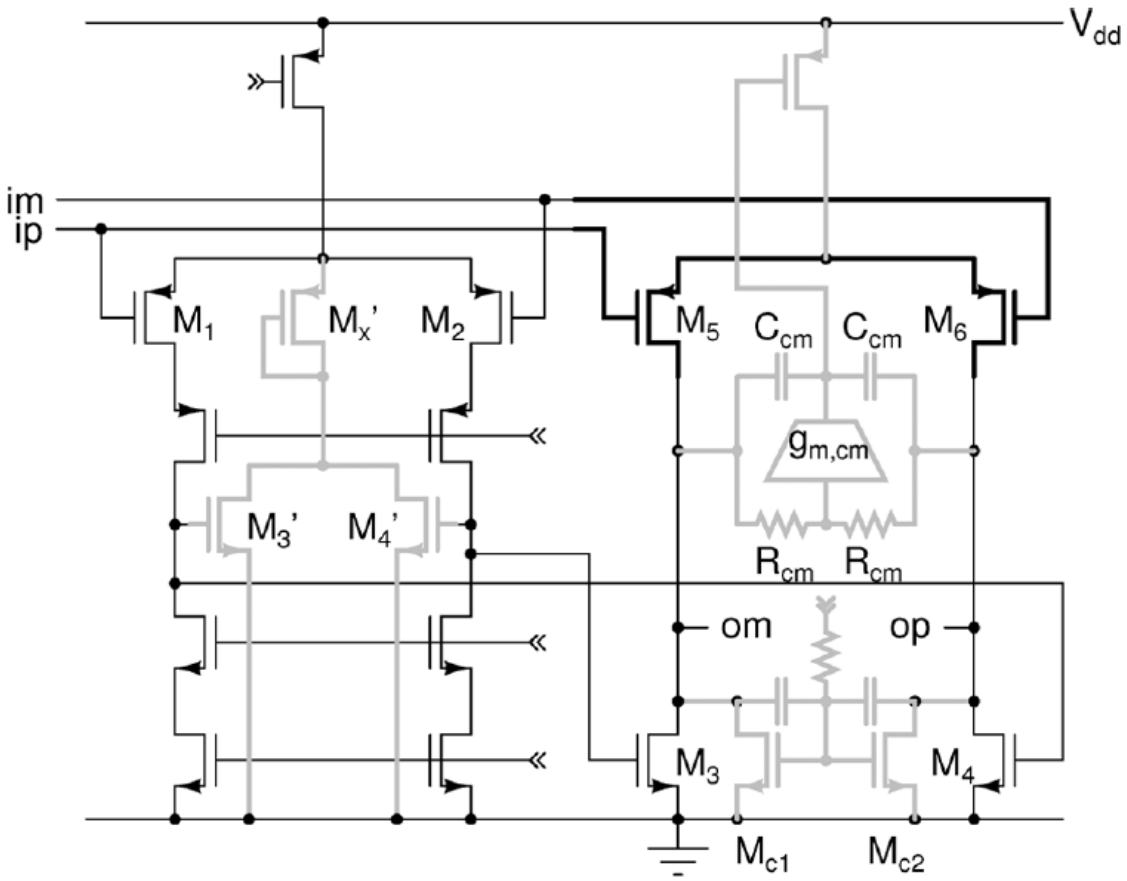
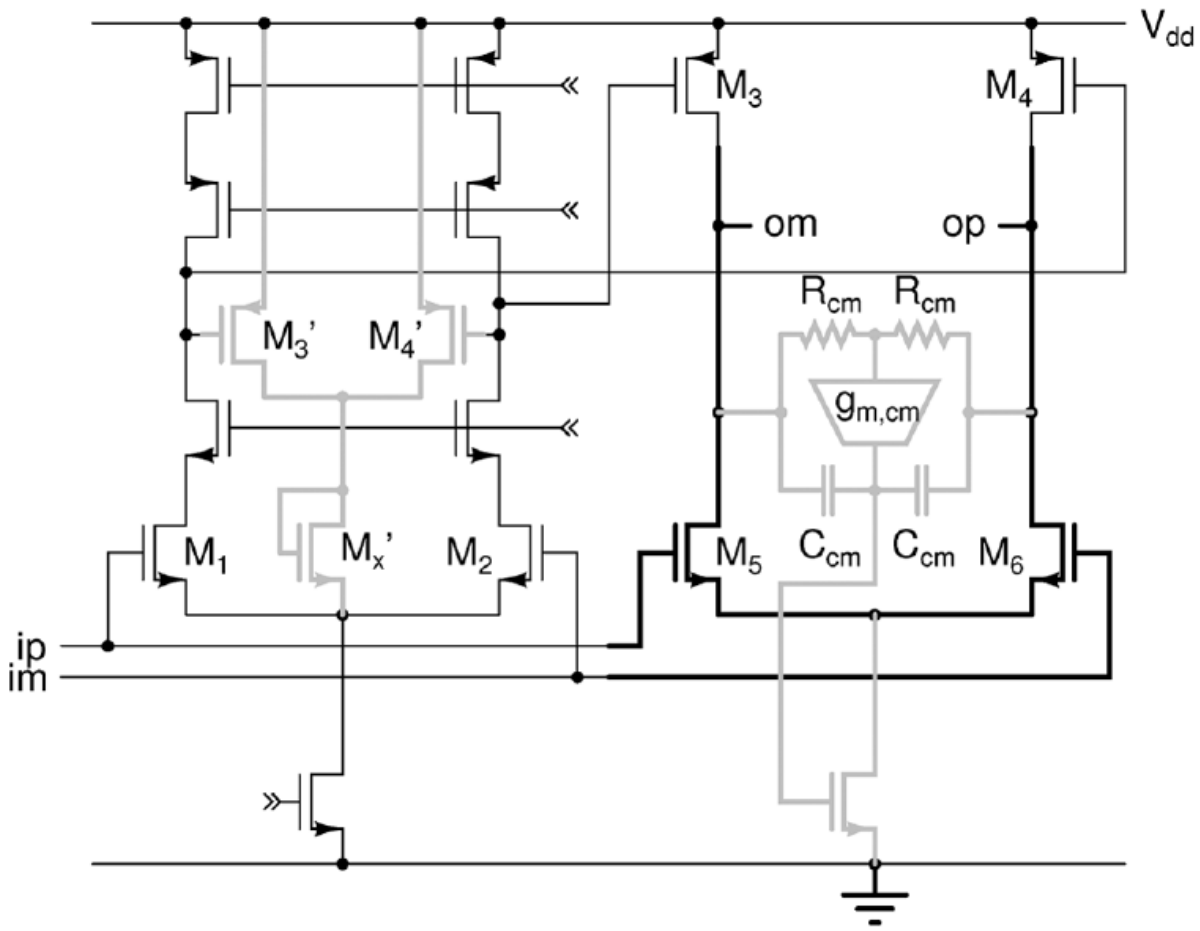


Fig. 12. Feedforward compensated opamp used in the first integrator. Feedforward path is shown in bold, and CMFB paths are shown in gray.


Vdd
M3
M4
om
op
Rcm
Rcm
M3'
M4'
gm,cm
M1
Mx'
M2
M5
Ccm
Ccm
M6
ip
im

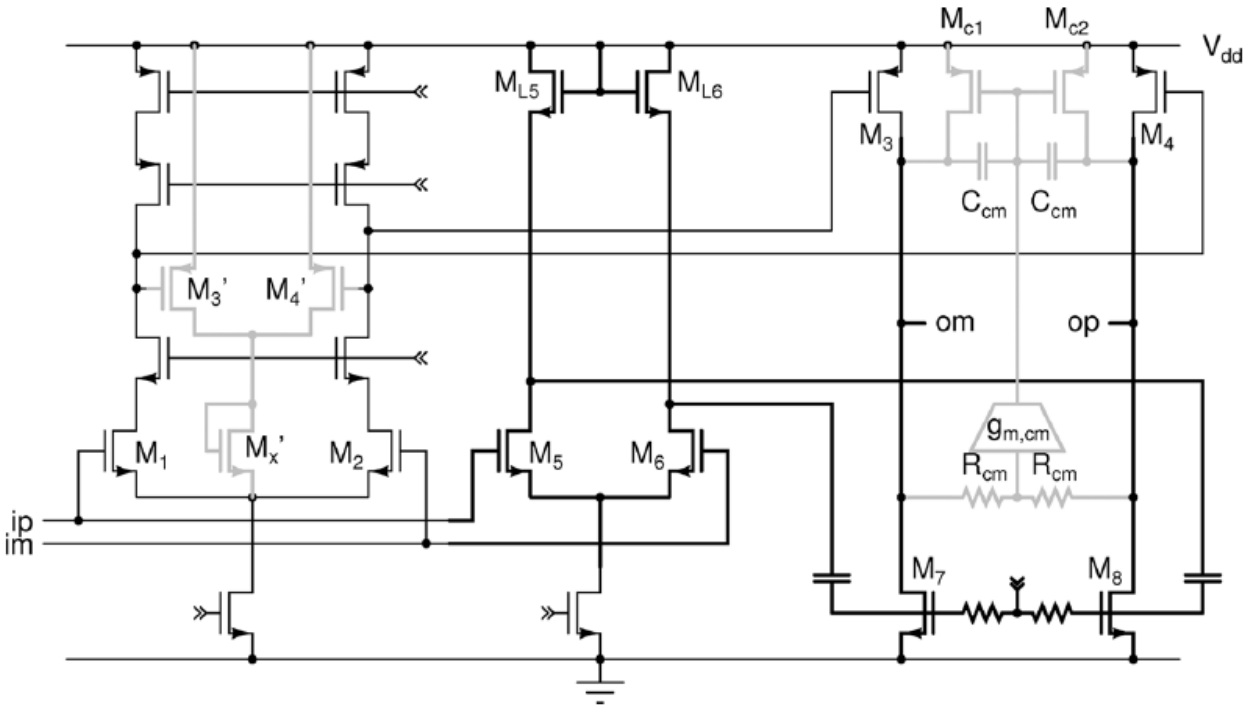
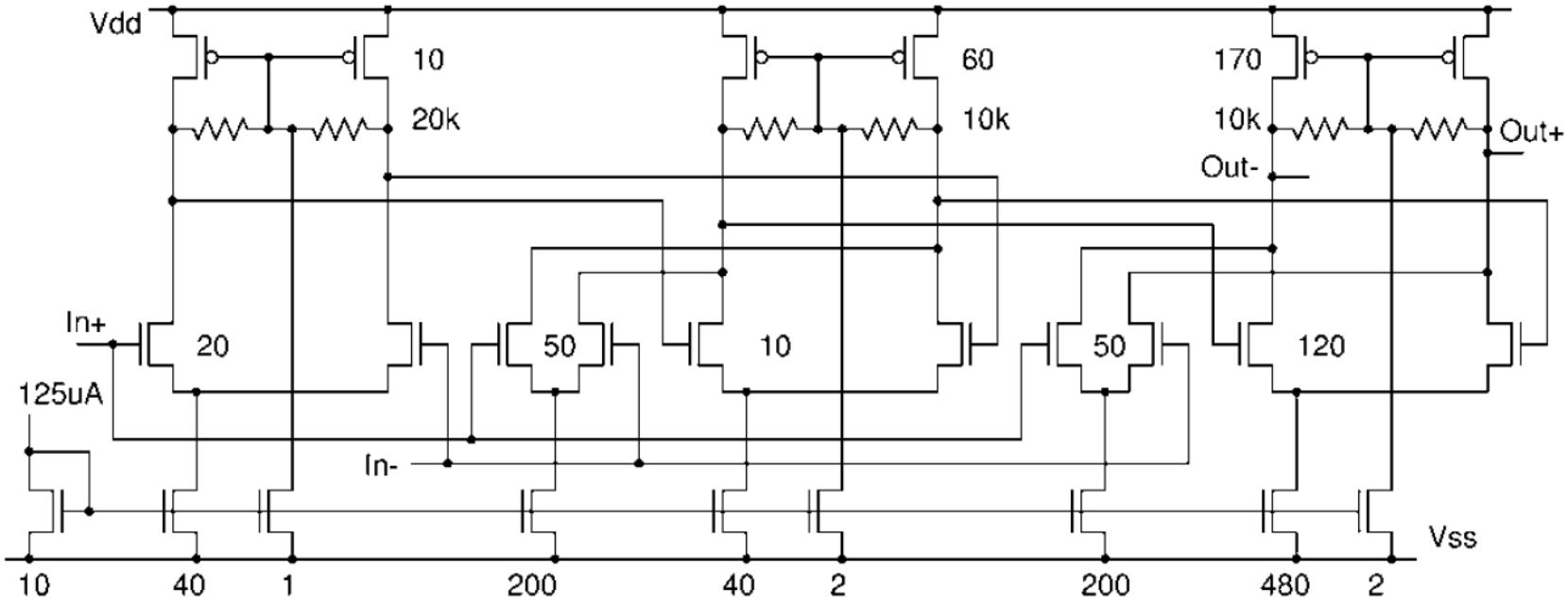


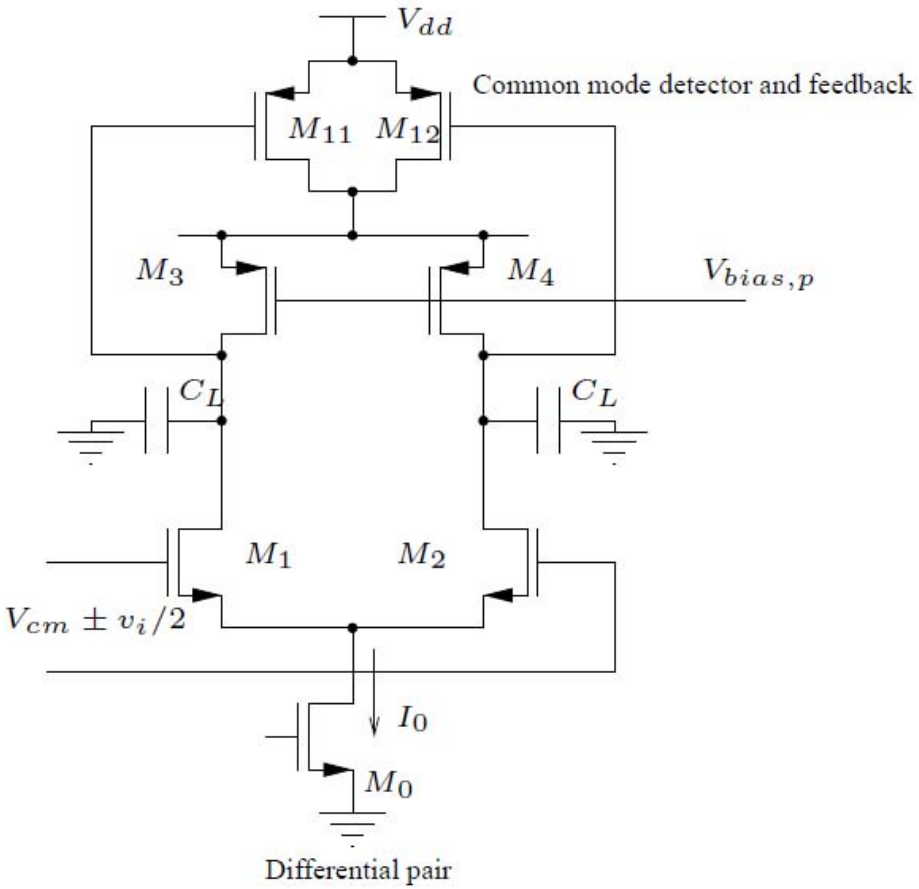
Fig. 14. Feedforward compensated opamp used in the summing amplifier. Feedforward path is shown in bold, and CMFB paths are shown in gray.

7.4 A 500MHz CMOS Anti-Alias Filter using Feed-Forward Op-amps with Local Common-Mode Feedback

Jeffrey Harrison, Neil Weste

Department of Electronics, Macquarie University, Marsfield, Australia




V_{dd}
Common mode detector and feedback
M_{11} M_{12}
M_3
M_4
$V_{bias,p}$
C_L
C_L
M_1
M_2
$V_{cm} \pm v_i/2$
I_0
M_0
Differential pair