一种低噪声的斩波电流反馈仪表放大器

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摘　要：提出了一种应用于生物电信号采集的低噪声仪表放大器，该电路采用带有米勒补偿的三级电流反馈结构来实现高共模抑制比，采用两级斩波结构显著减少 1/　f　噪声和直流失调(DC offset)，采用二阶 Sallen-Key 低通滤波器消除了由于斩波开关引入的输出纹波(Ripple). 该电路采用 SMIC 0.13　μm CMOS 工艺进行设计，在 1.2 V 电源电压下消耗电流为 48　μA，输入参考噪声功率谱密度(PSD)为 26 nV/rtHz，噪声效率因子(NEF)值为 6.4，共模抑制比为 114 dB.仿真结果表明，在第一谐波处，该电路将高频输出纹波降低了 1/43 倍.

关键词：　生物电信号；仪表放大器；低功耗；电流反馈；Sallen-Key 滤波器

A Low noise chopper current feedback instrumentation amplifier

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Abstract：A low-noise instrumentation amplifier isproposed for biopotential signals acquisition. This circuit use a three-stage current feedback topology with miller compensation to achieve a high common-mode rejection ratio. A two-stage chopping structure is used to significantly reduce 1/f noise and DC offset. The output ripple introduced by the chopper switch is eliminated by implanting a second-order Sallen-Key low-pass filter. The circuit is designed in a SMIC 0.13 μm CMOS process with a current dissipation of 48μA at 1.2 V supply voltage, and the input reference noise power spectral density (PSD) is 26nV/rtHz, the noise efficiency factor (NEF) is 6.4 and the common mode rejection ratio is 114 dB. The simulation results show that at the first harmonic, the circuit reduce the high-frequency output ripple by a factor of 1/43.

Key words：　instrumentation amplifier; current feedback; chopping;biopotentialsignals

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