**Switched-compensation technique in switched-capacitor circuits for achieving fast settling performance**

One of the major challenges to designing a perfect op-amp, the most widely used analog circuit block, is resolving the stability issue. In order to improve the stability performance of the op-amp, many compensation techniques had been proposed. Almost all of them were developed for continuous time and were then applied to discrete-time applications (e.g. switched-capacitor circuits). From the early 1980s onward, increasing number of op-amps are utilized in switched-capacitor circuit applications without any compensation method developed especially for switched-capacitor applications. Consequently, there remains a need to explore the possibility of designing a unique compensation method especially for switched-capacitor use.

A new switched-compensation technique (SCT) is proposed for switched-capacitor circuit applications where high speed is a critical index of their performance. In general, designers have to suffer from the trade-offs among accuracy, speed, and power dissipation. SCT avoids traditional approaches of designing high-speed, high-gain operational amplifiers which are, in many cases, limited by the technology process. Instead, it modifies the switched-capacitor circuit structure in order to utilize the under-damped response of the system which is usually seen as a drawback. SCT is introduced as a novel solution for achieving fast settling performance and lower quiescent power dissipation while still guaranteeing almost equivalent accuracy. SCT can be easily implemented into flip-around switched-capacitor amplifier circuits. This work explains the principle of the SCT and its implementation into multiplying digital to analog converter (MDAC) as a proof of concept. Simulation results are presented from an IBM 0.13um CMOS process. Compared with the conventional switched-capacitor amplifier, SCT reduces within 1% error the settling time and quiescent power consumption by half on average and by 75%, respectively.