Switched capacitor DC-DC converter with switch conductance modulation and Pesudo-fixed frequency control

A switched capacitor dc-dc converter with frequency-planned control is presented. By splitting the output stage switches in eight segments the output voltage can be regulated with a combination of switching frequency and switch conductance. This allows for switching at predetermined frequencies, 31.25 kHz, 250 kHz, 500 kHz, and 1 MHz, while maintaining regulation of the output voltage. The controller is implemented in 180 CMOS with a 1/3 series-parallel output stage designed for 3.6–4.2 V input, 1.2 V output, and 1–40 mA load current. The proposed controller is compared with a co-integrated pulse skipping controller and yields a 84.8% reduction in worst-case low-load output ripple voltage and a 1.5% increase in peak efficiency reaching 92.5%, while also providing a predictable spectrum of the switching noise, reducing the risk of interfering with other sensitive circuits.