Converter Topologies

Resonant (AC-link)

QSW & QR Converters

PWM (small ripple)



Converter Analysis

Sinusoidal Analysis

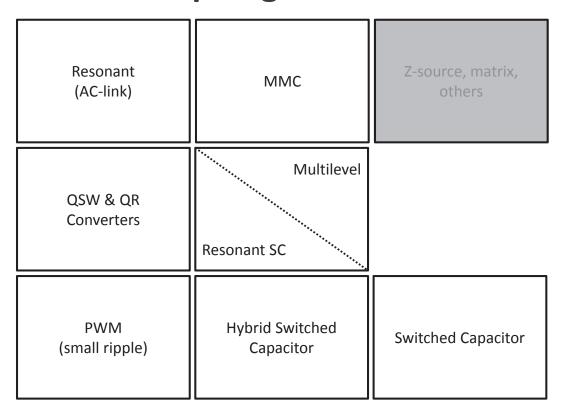
State Plane

QSW & QR Converters

Averaging

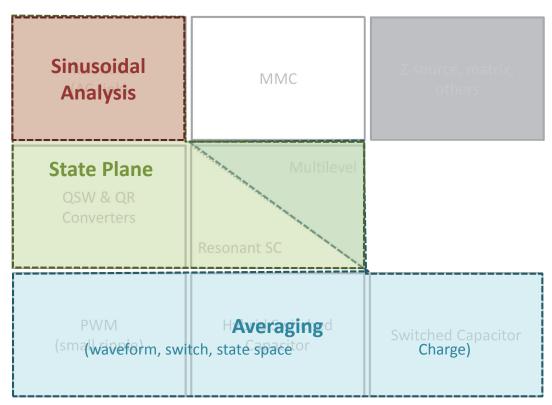
(waveform, switch, state space)

Converter Topologies





Converter Analysis



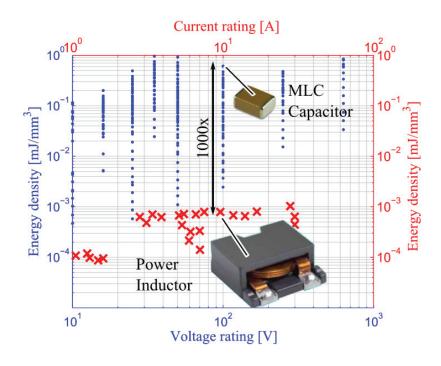
Major Remaining Topics in ECE 581

- Switched Capacitor Converters
- Discrete Time Modeling



SWITCHED CAPACITOR CONVERTERS

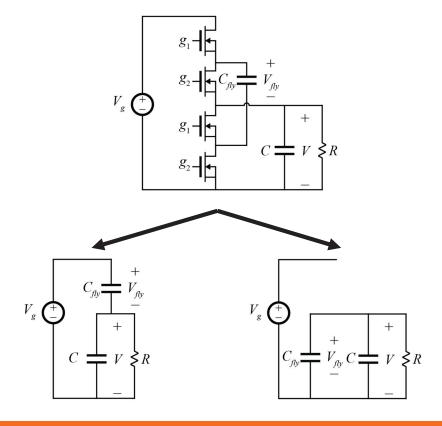
Switched Capacitor Converters



R. Pilawa Podgurski, "Extreme Power Density Converters - Fundamental Techniques and Selected Applications"



A 2:1 SC Converter



SC Converters

- Fixed conversion ratio
 - No regulation (except linear)
- Not lossless, even with ideal elements
- Can be very small, fully integrated
- Resonant versions can reduce loss
- Hybrid versions can allow regulation



Capacitor Charging: Voltage Source





Capacitor Charging: Current Source





Capacitor Charging: Resonant





Comparison of Capacitor Charging