Converter Topologies

- Resonant (AC-link)
- QSW & QR Converters
- PWM (small ripple)

Converter Analysis

- Sinusoidal Analysis
- State Plane
  - QSW & QR Converters
- Averaging
  - PWM (waveform, switch, state space)
Converter Topologies

- Resonant (AC-link)
- QSW & QR Converters
- PWM (small ripple)
- MMC
- Multilevel
- Resonant SC
- Hybrid Switched Capacitor
- Switched Capacitor
- Z-source, matrix, others

Converter Analysis

- Sinusoidal Analysis
- State Plane
- Averaging
- MMC
- Multilevel
- Resonant SC
- PWM (small ripple)
- Hybrid Switched Capacitor
- Switched Capacitor Charge
- Z-source, matrix, others
Major Remaining Topics in ECE 581

- Switched Capacitor Converters
- Discrete Time Modeling
Switched Capacitor Converters

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