

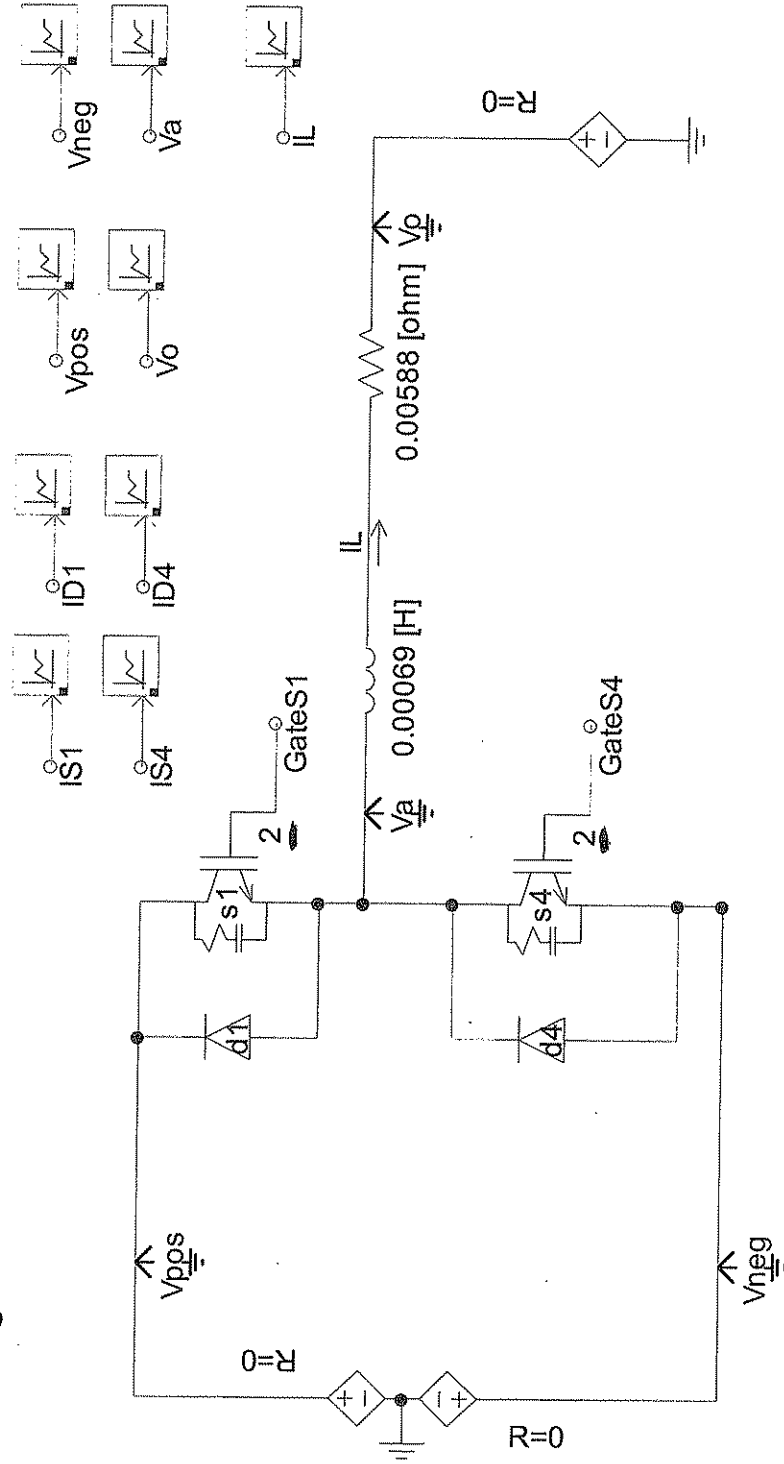
ECE 404-TD / 504-TD

ST: T&D APPLICATIONS OF
VOLTAGE SOURCE CONVERTERS

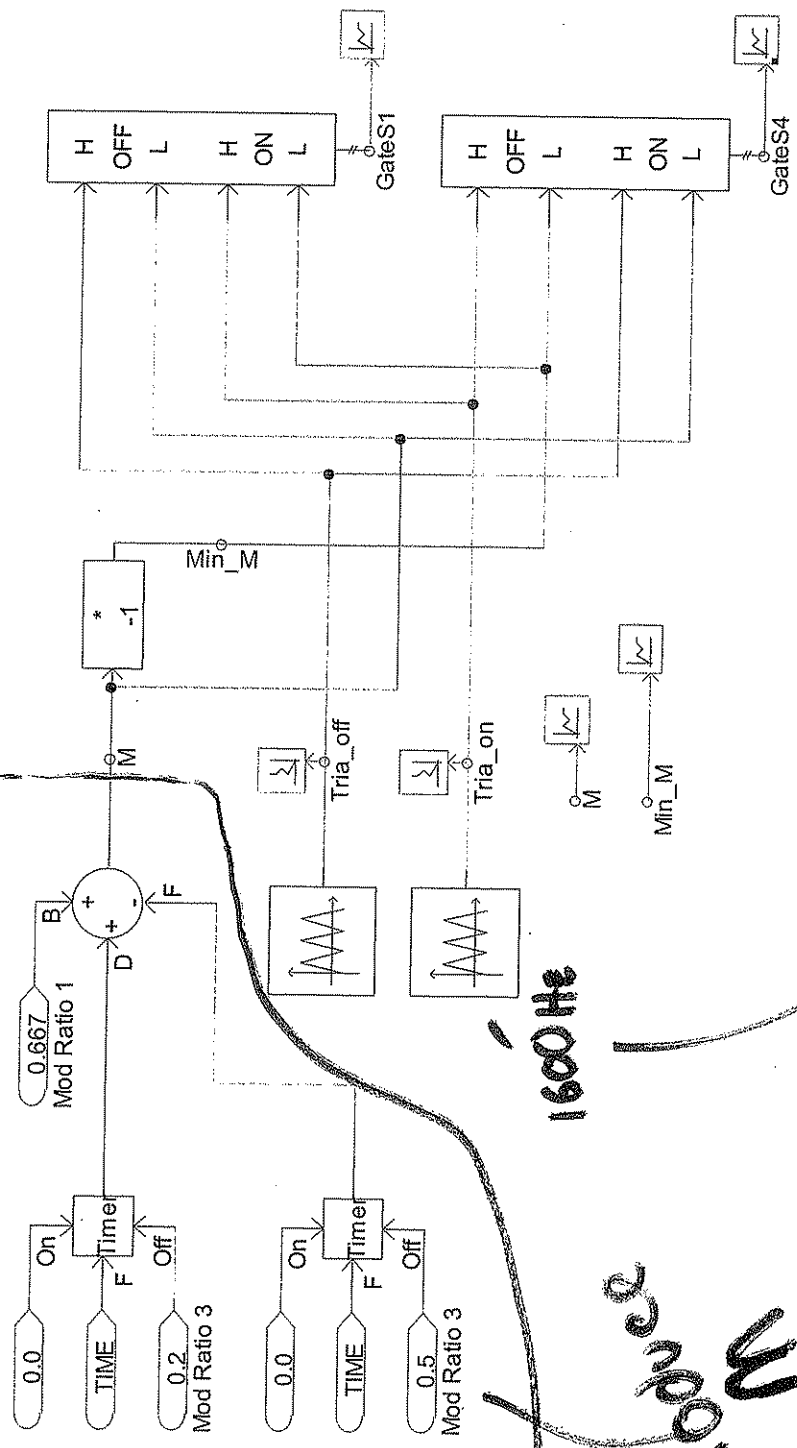
SESSION no. 32

I. Averaged Converter model in PSCAD/EMTDC

- Switching Power circuit



• Gate Control and Modulation

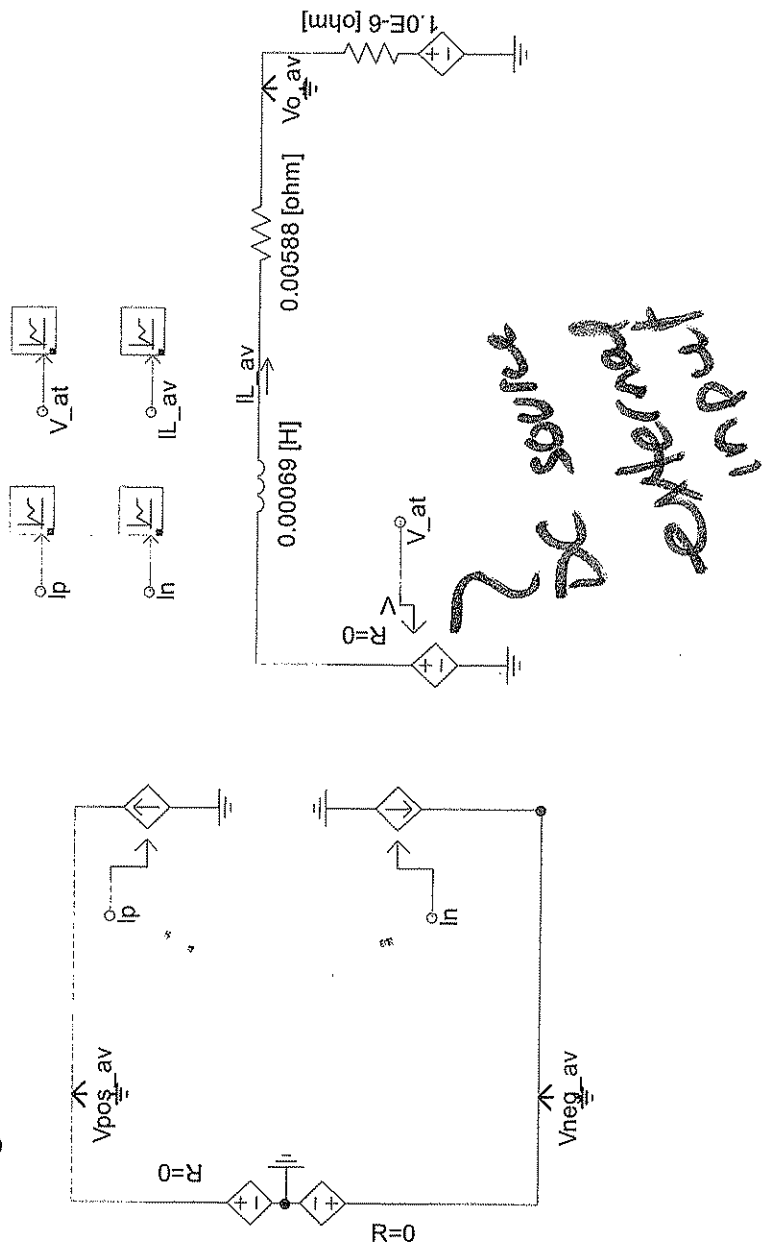


1600 Hz
Produce PWM

~~Produce PWM~~

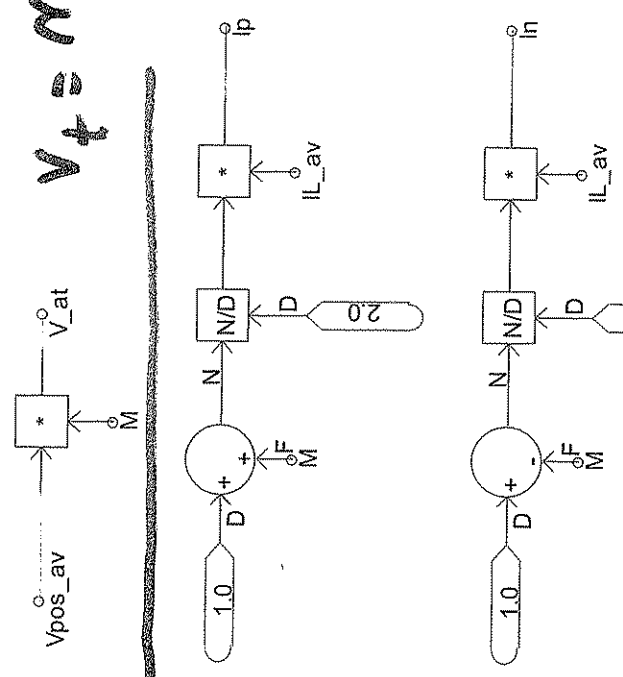
Generate pulses
Gate pulses

• Averaged Model: Power Circuit

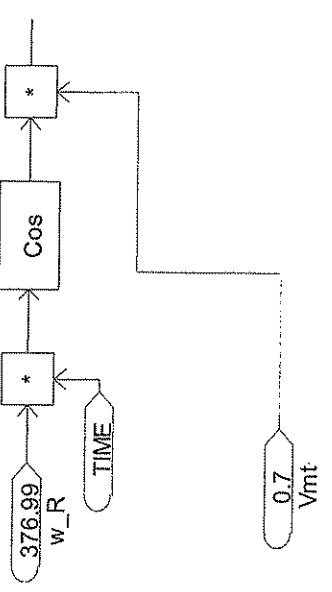


- Averaged Model: Control Equations

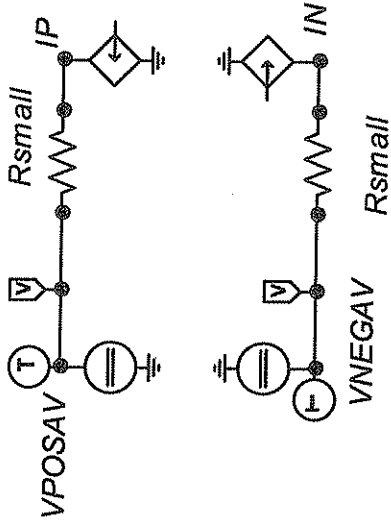
$$V_t = m \frac{V_{dc}}{2}$$



- Inverter Case: Change sources and modulation function

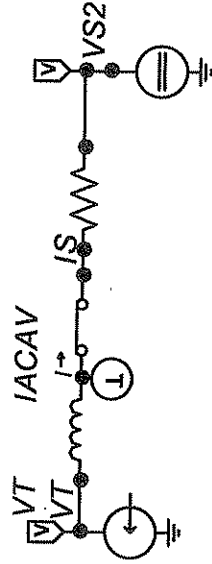


- Closed loop control (DC-DC first)
 → Add control measurements

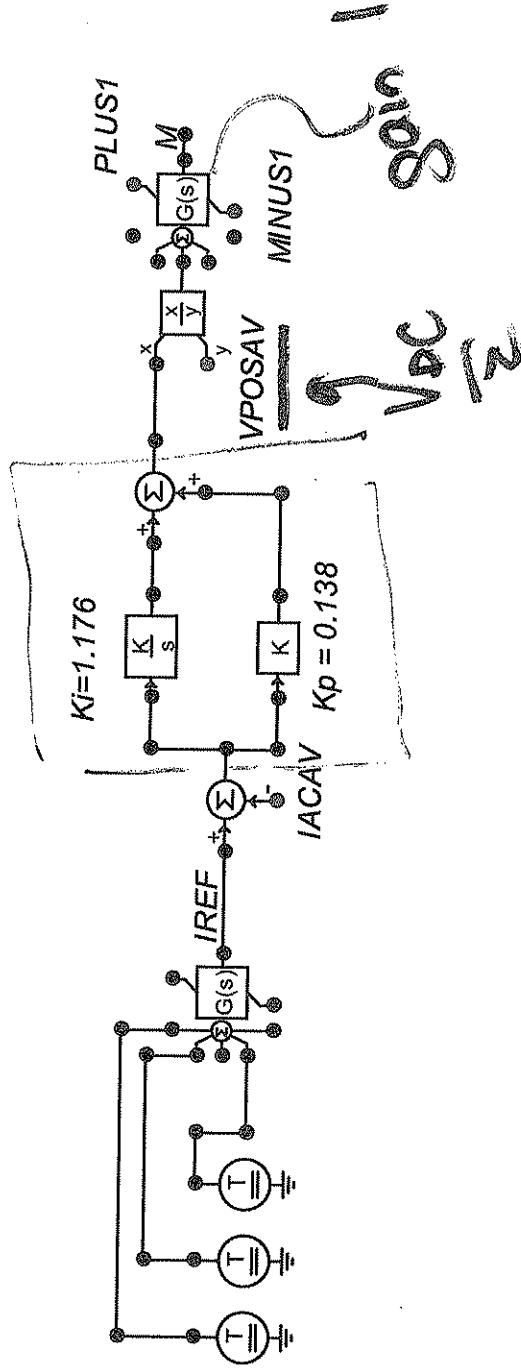


→ Control circuit

Averaged Model



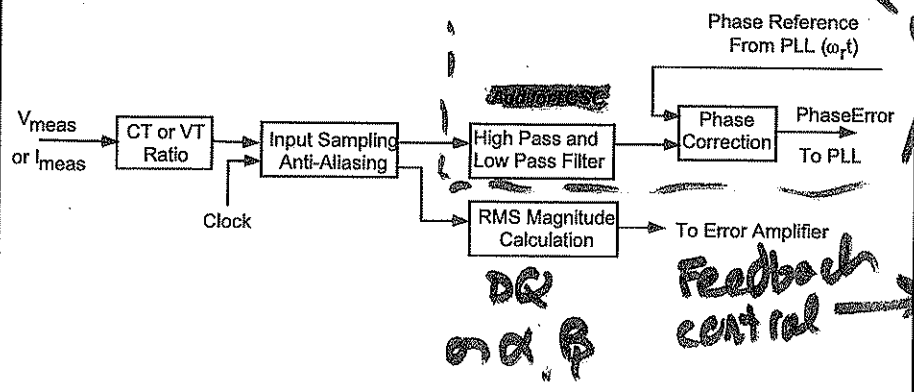
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U I Input Filtering and Phase Correction

ECE 404/504
Lecture 32



Synchronization

1

Spring 2013

U I Synchronization

ECE 404/504
Lecture 32

- Detect zero crossing of input fundamental frequency waveform
 - » Possibly delay by 90 degree to get peak
 - » Proper delay requires knowledge of actual system frequency (not the ideal value)
 - » Inputs include phase error (from measuring circuit and system drift), and base frequency
- Note use of "analog" signals, could do this digitally as well

Synchronization

2

Spring 2013

