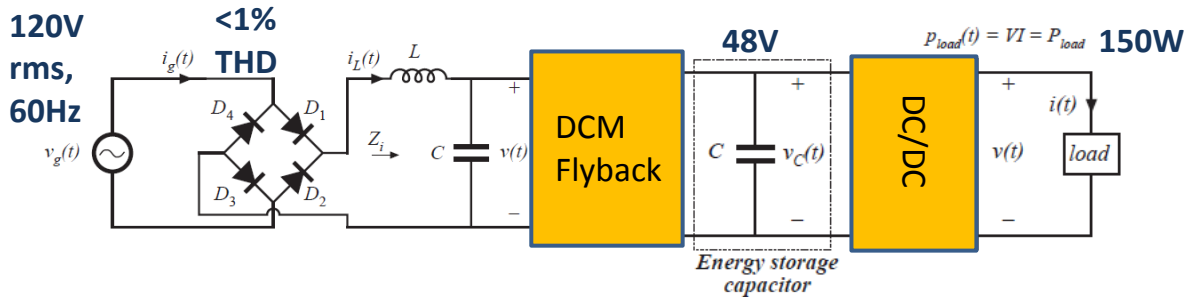


Final Exam/Project: DCM Flyback Energy Storage and Control Loop Design:

120 Vrms Input Voltage	60 Hz Input Frequency	48Vdc Intermediate Voltage	150 W Output Power	<1% THD
---	--	---	---	-----------------------------



System Description:

Consider the power system shown above. The input to the system is a single phase ac voltage which is diode rectified. A DCM flyback converter is used to provide isolation and give very high power factor with low THD. An intermediate “loosely regulated” 48V bus is created at the output of the isolated DCM flyback converter. An energy storage capacitor is used to keep the system alive in the event of a power outage at the AC input. In addition, this capacitor stores the difference in instantaneous power flowing between the input and output power. The “loosely” regulated 48V is fed to another DC-DC converter which tightly regulates an output voltage service for a computer processor. The DC/DC converter is a commercial off the shelf “brick” Buck Converter. An input LC filter is used to filter the switching currents drawn from the DCM flyback, while maintaining low THD on the input current, $i_g(t)$. You are to design the controller for the DCM flyback to work in conjunction with the external energy storage and perform a full end to end system simulation in MATLAB Simulink. Assume the PWM controller uses a reference voltage of 2.5V. The saw tooth generator has a peak to peak amplitude of 2V.

DCM Flyback Parameters :

primary Turns: $n_p = 7$

secondary Turns: $n_s = 2$

Magnetizing Inductance: $L_m = 106 \mu H$

Switching Frequency: $f_s = 100 kHz$

Input Filter Parameters :

Filter Inductance: $L_f = 10.2 mH$

Filter Capacitor: $C_f = 1.1 \mu F$

Buck Converter Parameters :

$v(t) = V = 5V$

Maximum Duty Cycle $D_{max} = 0.98$

Converter Efficiency = 90%

Pout=150W