Week 8: Assignment 8

Due on 2011-06-22, 20:00 IST

The drive diagram above is a peak current mode control implementation of a continuous boost rectifier. In the modeling approach, the average inductor current for one time period is to be calculated using the time average of these inductor currents. The peak inductor current can be given by the following equations:

\[ i_{Lp}(t) = \frac{V_{in}}{D \cdot V_{cc}} \]

\[ i_{L}(t) = \frac{V_{in}}{D \cdot V_{cc}} \cdot \frac{1}{T} \]

where:
- \( D \) = duty cycle
- \( V_{in} \) = input voltage
- \( V_{cc} \) = constant
- \( T \) = time period

The expression of \( i_{Lp} \) is defined as:

\[ i_{Lp} = \frac{V_{in}}{D \cdot V_{cc}} \]

The expression of \( i_{L} \) is defined as:

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The average inductor current is implemented to regulate the output voltage of the boost rectifier. In the drive logic:

\[ i_{L} = \text{average inductor current} \]

\[ V_{out} = \text{average output voltage} \]

The average inductor current is controlled by using a low pass filter with a frequency:

\[ f = \frac{1}{2\pi \cdot R \cdot C} \]

The peak inductor current at steady state is determined using the following equation:

\[ i_{Lp} = \frac{V_{in}}{D \cdot V_{cc}} \]

\[ \frac{1}{2} \left( i_{Lp} - i_{L} \right) \]

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