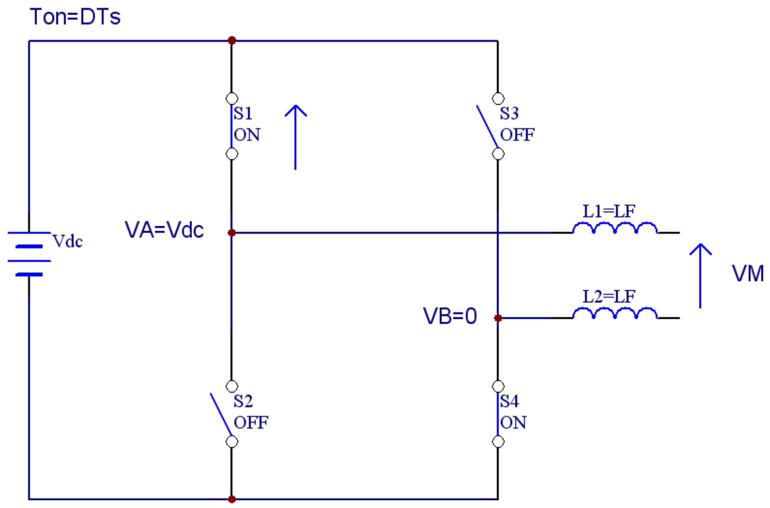
From the equivalent schematic reported below:

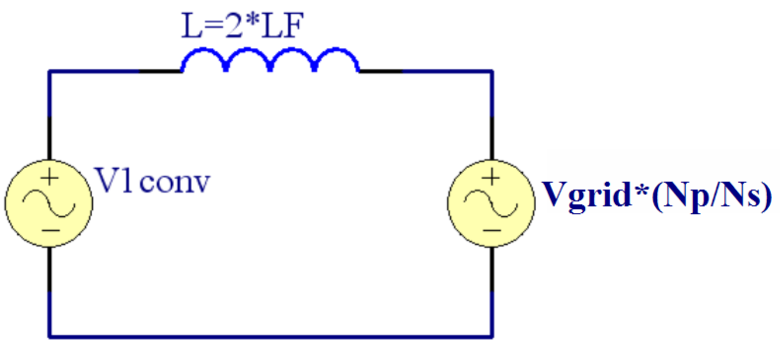


the fundamental component generated from the PWM drived inverter stage V1conv is equal to:

$$v_m(t) = v_A(t) - v_B(t) = V_{PV} \cdot D - [V_{PV} \cdot (1-D)] = V_{PV} \cdot (2D-1)$$

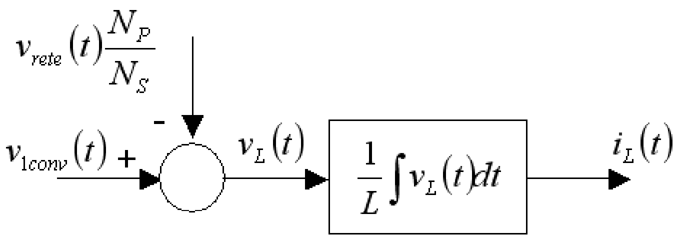
where VM is the voltage at the primary side of the isolation transfomer (here in my schematic this is a voltage elevator then the turn ratio Ns/Np is greather than 1), also I've put two filter inductor but this is equivalent to one with inductance value equal to the sum of the two single inductance.

After that we can write the following Kirchhoff voltage equation:



$$\begin{aligned}
&v_{1conv}(t) = v_L(t) + v_{grid}(t)\frac{N_P}{N_S} \\
&v_{1conv}(t) - v_{grid}(t)\frac{N_P}{N_S} = v_L(t) \\
&v_{1conv}(t) - v_{grid}(t)\frac{N_P}{N_S} = L\frac{di_L(t)}{dt} \\
&\frac{di_L(t)}{dt} = \frac{1}{L}\left(v_{1conv}(t) - v_{grid}(t)\frac{N_P}{N_S}\right) \\
&i_L(t) = \frac{1}{L}\int\left(v_{1conv}(t) - v_{grid}(t)\frac{N_P}{N_S}\right)dt
\end{aligned} \tag{1}$$

hence we can draw this equivalent block schematic for the power inverter stage.



Into the schematic the fundamental component of the inverter is related to the PWM value by:

$$v_{1conv}(t) = V_{PV}\left(2\frac{v_{control}(t)}{V_{TRI}} - 1\right) = 2\frac{V_{PV}}{V_{TRI}}v_{control}(t) - V_{PV} \tag{2}$$

then:

$$\begin{aligned} & v_{1conv}(t) = k \cdot v_{control}(t) - V_{PV} \\ & k = 2\frac{V_{PV}}{V_{TRI}} \end{aligned} \tag{3}$$

Using (2) into the (1) we obtain:

$$L\frac{di_L(t)}{dt} = v_{1conv}(t) - v_{grid}(t)\frac{N_P}{N_S}$$

$$L\frac{di_L(t)}{dt} = k \cdot v_{control}(t) - V_{PV} - v_{grid}(t)\frac{N_P}{N_S}$$

$$\frac{di_L(t)}{dt} = \frac{k}{L} \cdot v_{control}(t) - \frac{V_{PV}}{L} - \frac{1}{L} \cdot \frac{N_P}{N_S} \cdot v_{grid}(t)$$

The output inverter current is equal to:

$$i_O(t) = i_L(t)\frac{N_P}{N_S} \quad \rightarrow \quad \frac{di_O(t)}{dt} = \frac{N_P}{N_S} \cdot \frac{di_L(t)}{dt}$$

then:

$$\frac{di_O(t)}{dt} = \frac{N_P}{N_S} \cdot \left(\frac{k}{L} \cdot v_{control}(t) - \frac{V_{PV}}{L} - \frac{1}{L} \cdot \frac{N_P}{N_S} \cdot v_{rete}(t)\right)$$

$$\frac{di_O(t)}{dt} = \frac{N_P}{N_S}\frac{k}{L} \cdot v_{control}(t) - \frac{N_P}{N_S}\frac{V_{PV}}{L} - \frac{1}{L} \cdot \left(\frac{N_P}{N_S}\right)^2 \cdot v_{rete}(t) \tag{4}$$

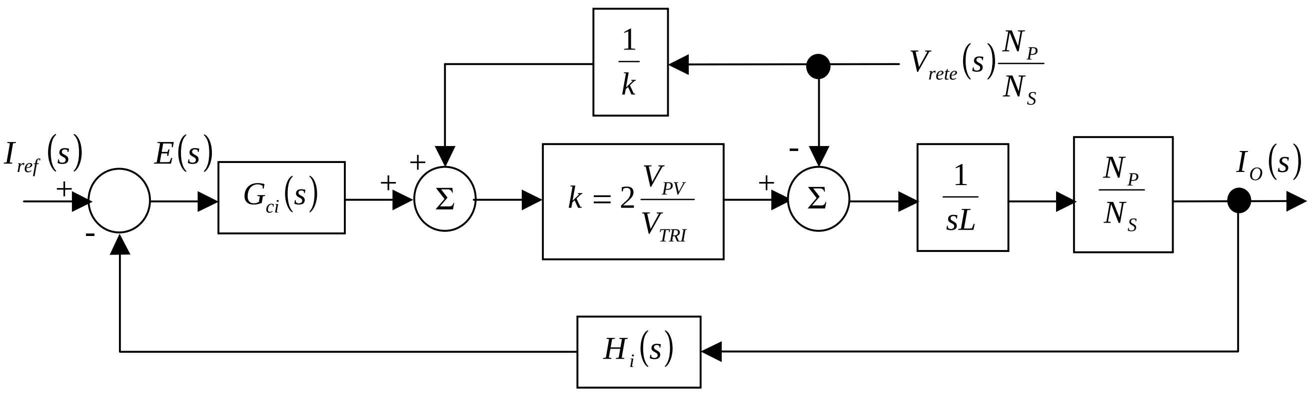
taking the the Laplace transformation of the (4) give us:

$$I_O(s)=\frac{N_P}{N_S}\cdot\left(\frac{k}{sL}\cdot V_{control}(s)-\frac{V_{PV}}{sL}-\frac{1}{sL}\cdot\frac{N_P}{N_S}\cdot V_{grid}(s)\right) \tag{5}$$

But our goal is control the output current then we must have a control loop around the inverter stage then we can define a error signal equal to the difference between the desired output current (the reference) and the actual measured output inverter current injected into the grid:

$$E(t)=I_{Oref}(s)-I_{Oscaled}(s)$$

At this point we can draw the following control loop schematic (s-domain) where the grid voltage disturbance component can be cancelled by using a feed-forward block with gain 1/k, in this way the effect of the grid component on the output signal is cancelled.



Into the schematic Gci(s) is the current compensator block and the Hi(s) the current sensor transfer function.

The input-output transfer function can be calculated by inspection:

$$E(s)=I_{ref}(s)-H_i(s)I_O(s) \tag{6}$$

$$\begin{aligned}I_O(s)&=\left[\left(E(s)G_{ci}(s)+\frac{1}{k}\frac{N_P}{N_S}V_{rete}(s)\right)\cdot k-\frac{N_P}{N_S}V_{rete}(s)\right]\cdot\frac{1}{sL}\cdot\frac{N_P}{N_S}=\\&=\left(kE(s)G_{ci}(s)+\frac{N_P}{N_S}V_{rete}(s)-\frac{N_P}{N_S}V_{rete}(s)\right)\cdot\frac{1}{sL}\cdot\frac{N_P}{N_S}\end{aligned} \tag{7}$$

that prove the effect of the feed-forward block to avoid the grid component noise.
Then by using (6) in (7) we can write:

$$I_O(s)=\left(kG_{ci}(s)I_{ref}(s)-kG_{ci}(s)H_i(s)I_O(s)\right)\cdot\frac{1}{sL}\cdot\frac{N_P}{N_S}$$

$$I_O(s)\left(1+kG_{ci}(s)H_i(s)\frac{1}{sL}\cdot\frac{N_P}{N_S}\right)=kG_{ci}(s)I_{ref}(s)\cdot\frac{1}{sL}\cdot\frac{N_P}{N_S}$$

$$I_O(s)=\frac{kG_{ci}(s)\cdot\frac{1}{sL}\cdot\frac{N_P}{N_S}}{1+kG_{ci}(s)H_i(s)\frac{1}{sL}\cdot\frac{N_P}{N_S}}I_{ref}(s)$$

then finally:

$$\boxed{\begin{array}{l} I_O(s)=\dfrac{\frac{1}{H_i(s)}}{1+sL\dfrac{1}{kG_{ci}(s)H_i(s)}\cdot\dfrac{N_S}{N_P}}\cdot I_{ref}(s) \\ k=2\dfrac{V_{PV}}{V_{TRI}} \end{array}} \tag{73}$$

the pole is located at:

$$1+j\omega T=0\rightarrow\omega=\frac{1}{|T|}=\frac{1}{L\dfrac{1}{kG_{ci}(s)H_i(s)}\cdot\dfrac{N_S}{N_P}}=\frac{kG_{ci}(s)H_i(s)}{L}\cdot\frac{N_P}{N_S}$$

By substituting the k and L with their expression we obtain:

$$f_p=\frac{1}{2\pi}\cdot\frac{2\cdot V_{PV}}{V_{TRI}}\cdot\frac{G_{ci}(s)\cdot H_i(s)}{(2\cdot L_F)}\cdot\frac{N_P}{N_S}$$

then finally:

$$\boxed{f_p=\frac{1}{\pi}\cdot\frac{V_{PV}}{V_{TRI}}\cdot\frac{G_{ci}(s)\cdot H_i(s)}{(2\cdot L_F)}\cdot\frac{N_P}{N_S}} \tag{74}$$