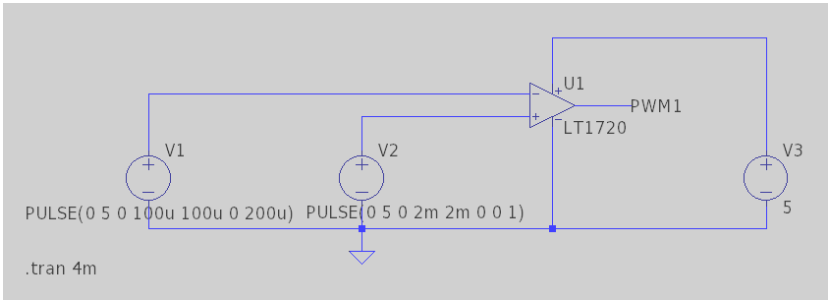
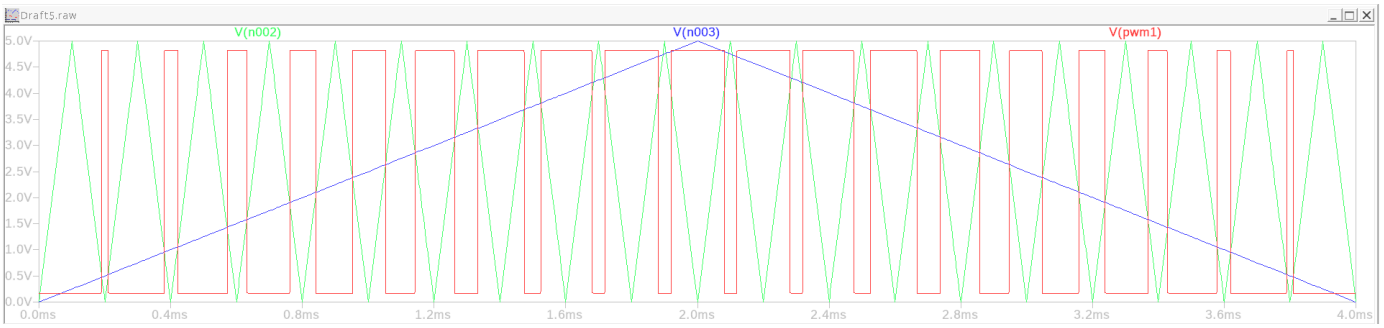
Assignment 5 - Bridge DC-DC converters

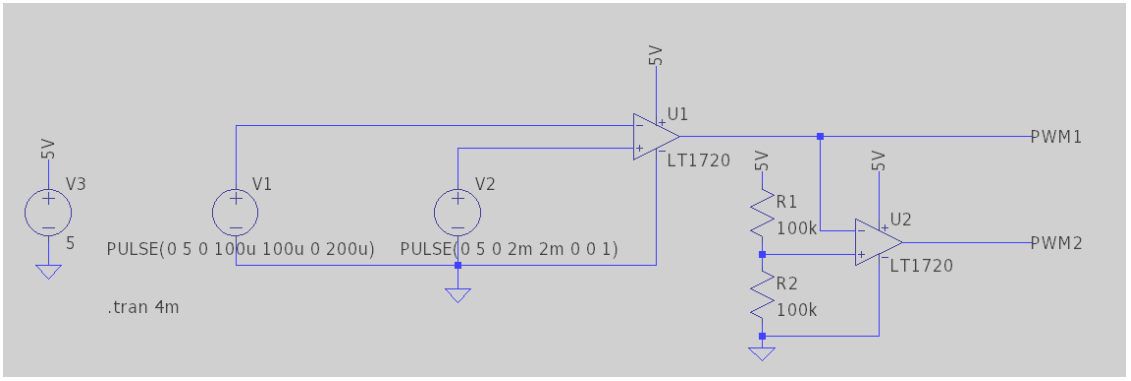
Forjanic Rémy (511448)

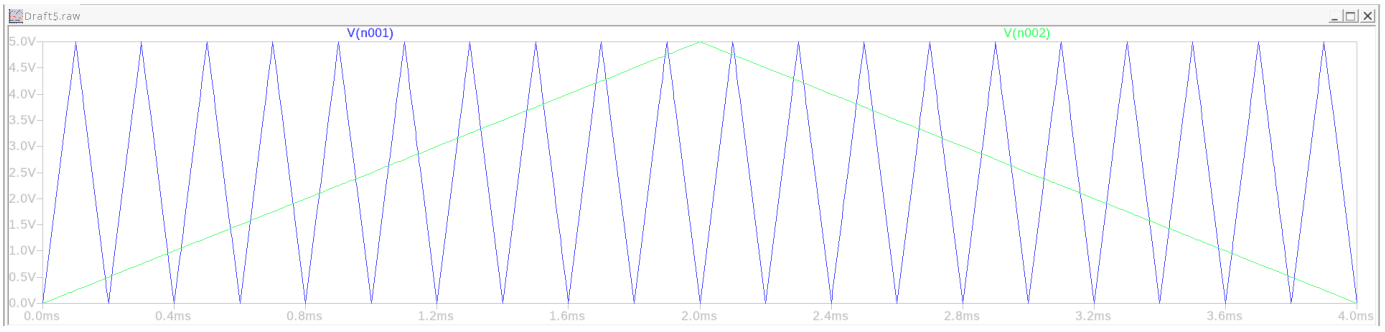
Question 1 - Control of DC-DC converters: Single PWM

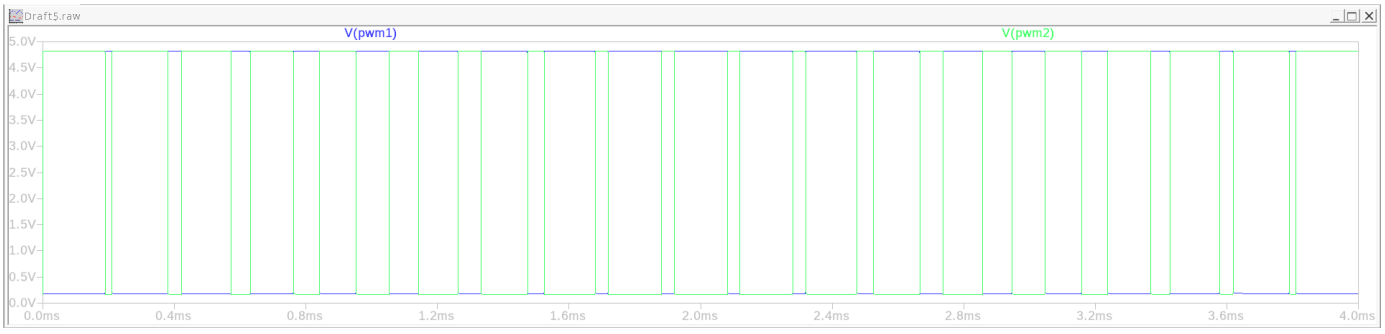




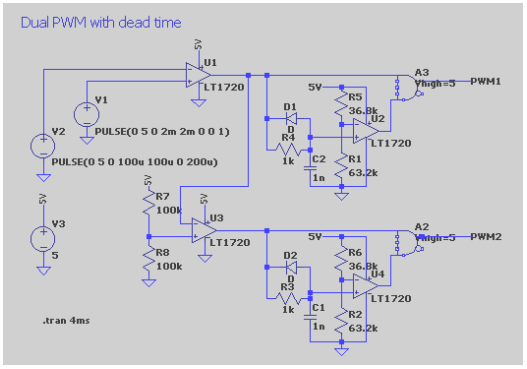
Question 2 - Control of DC-DC converters: Dual PWM

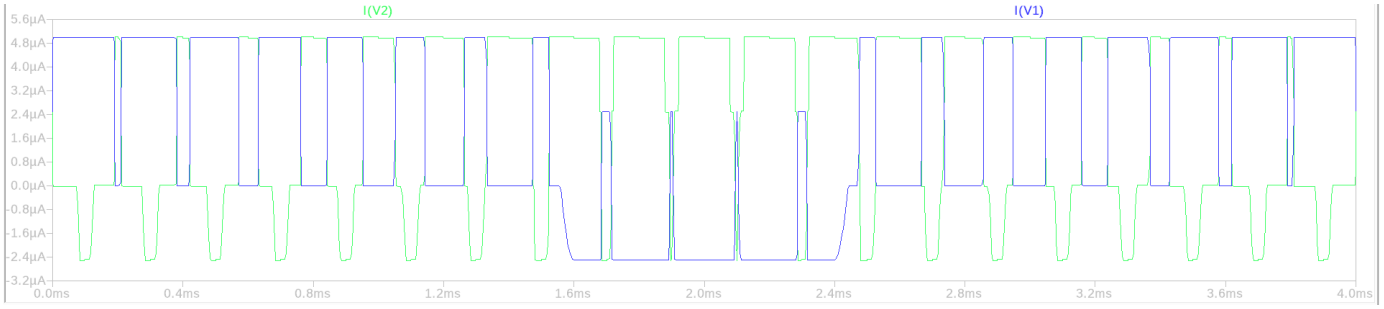


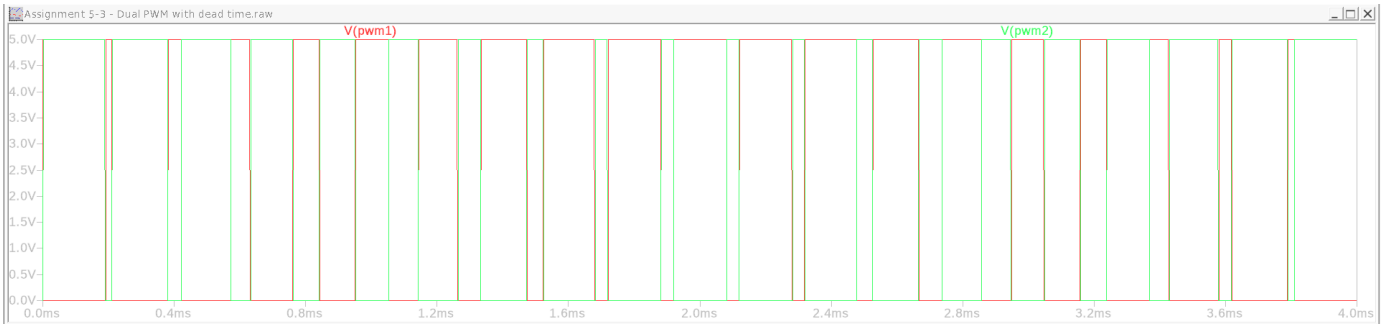




Question 3 - Control of DC-DC converters: Dual PWM with dead time



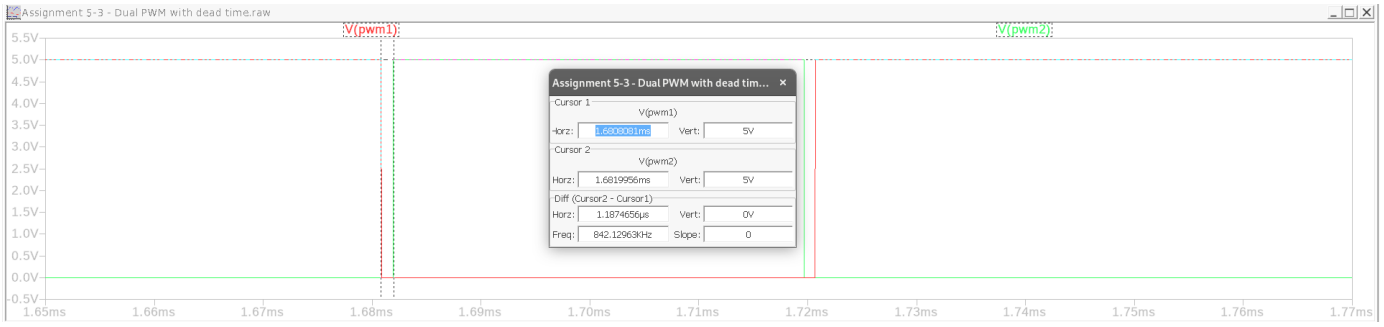




Calculate the dead time (the time between the turn off of PWM1 and turn on of PWM2).

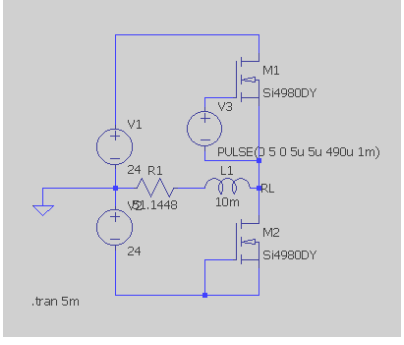
$t_{\Delta 1} = R_3 \times C_1 = 1k \times 1n = 1\mu s$

Verify the calculated dead time with the simulation results.

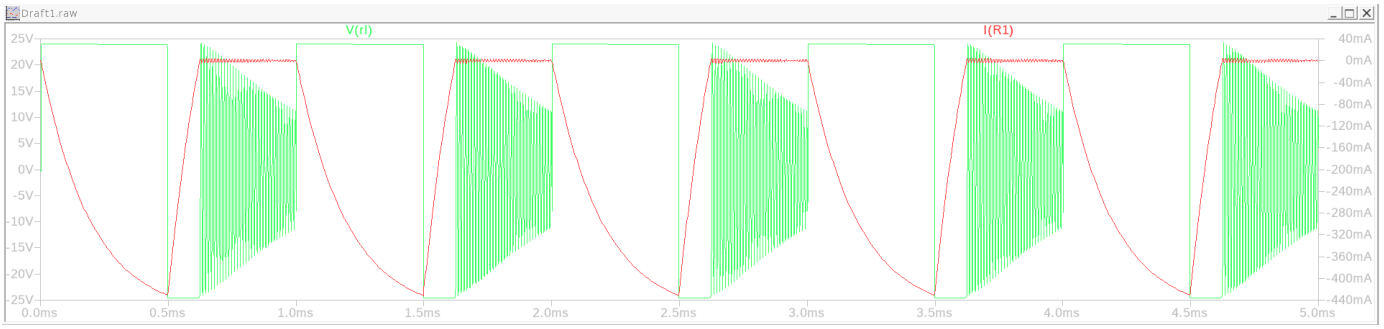


Question 4 - Half bridge: Unipolar switching

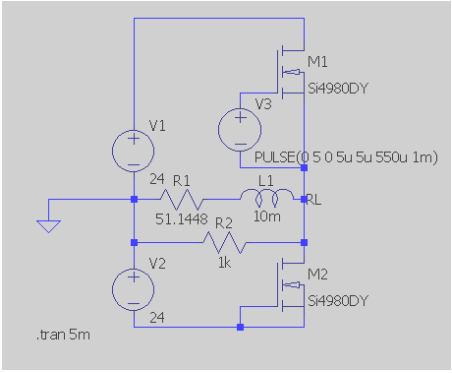
The simulation has been done using the circuit given in the assignment however the duty cycle is not 0.5 but 0.49.



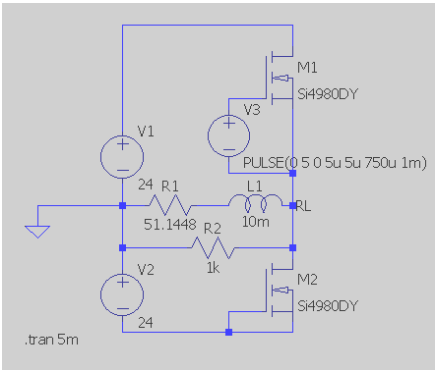
Show in a simulation the voltage across and current through the RL load.



Question 5 - Unipolar switching of a RL load with bleeding resistor across the load

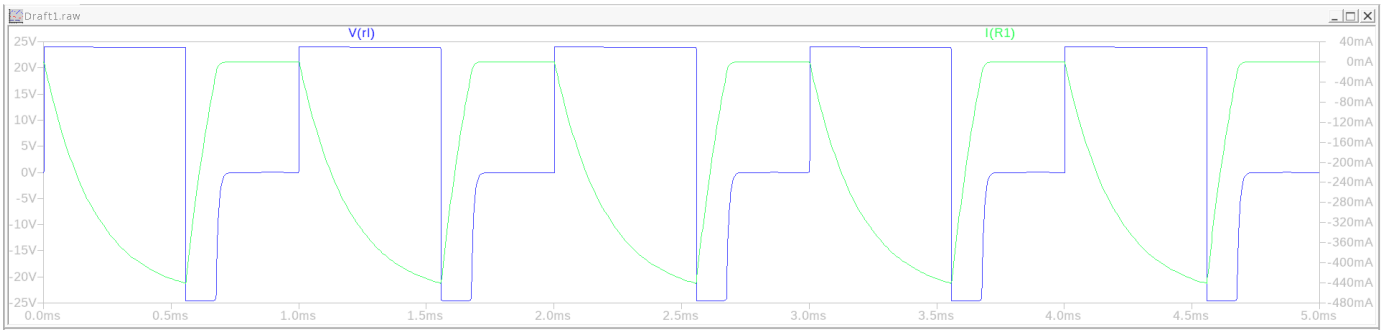


$D = 0.55$

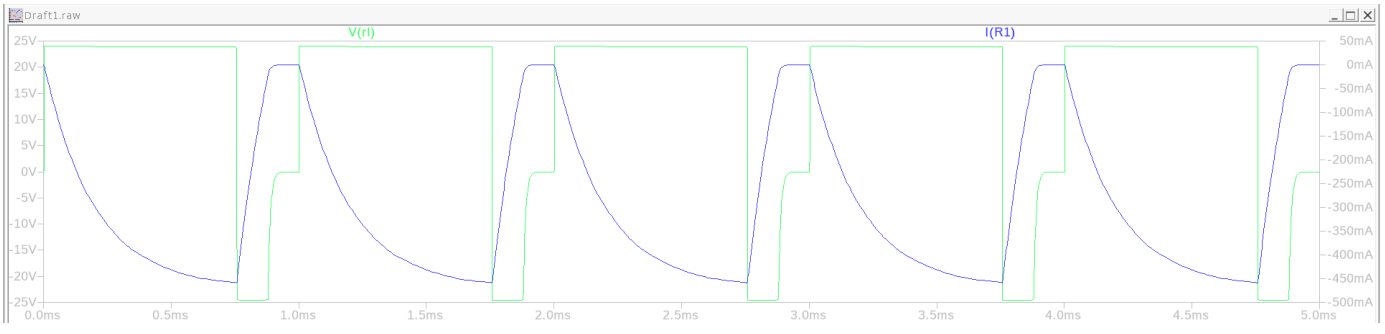


$D = 0.75$

Show in a simulation the voltage across and current through the RL load.

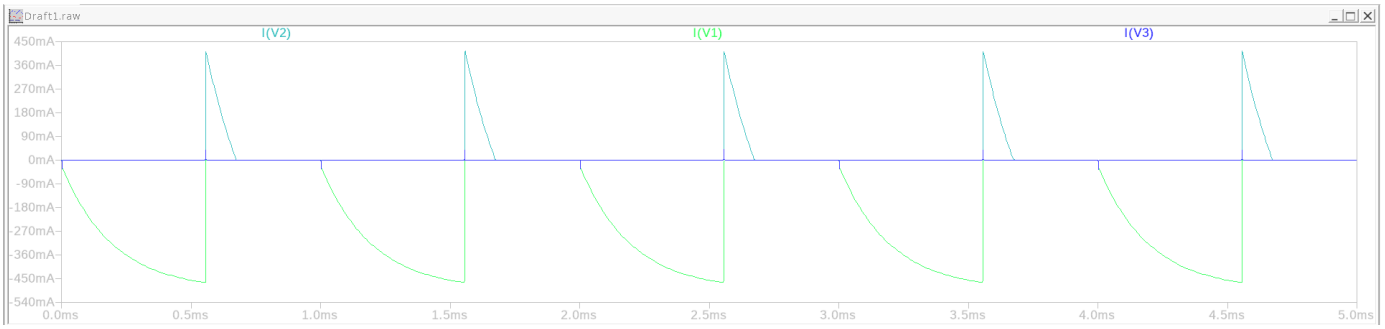


$D = 0.55$

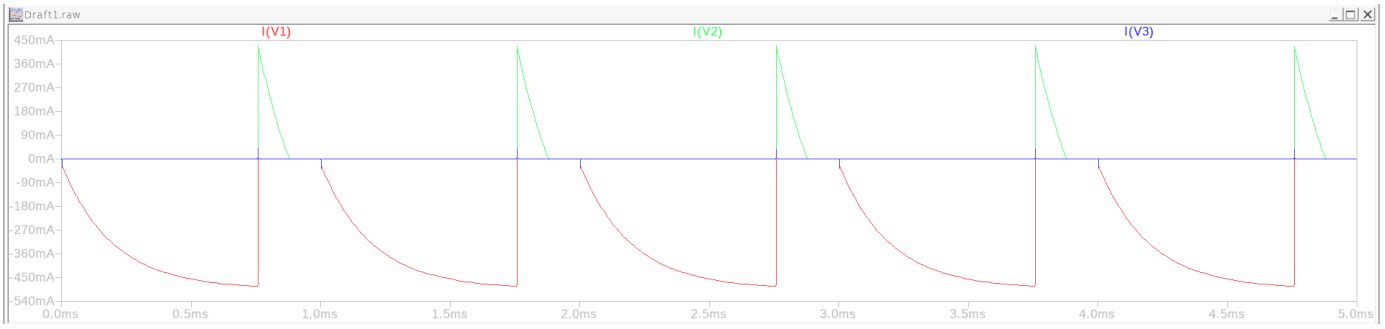


$D = 0.75$

Show in a simulation the source currents.

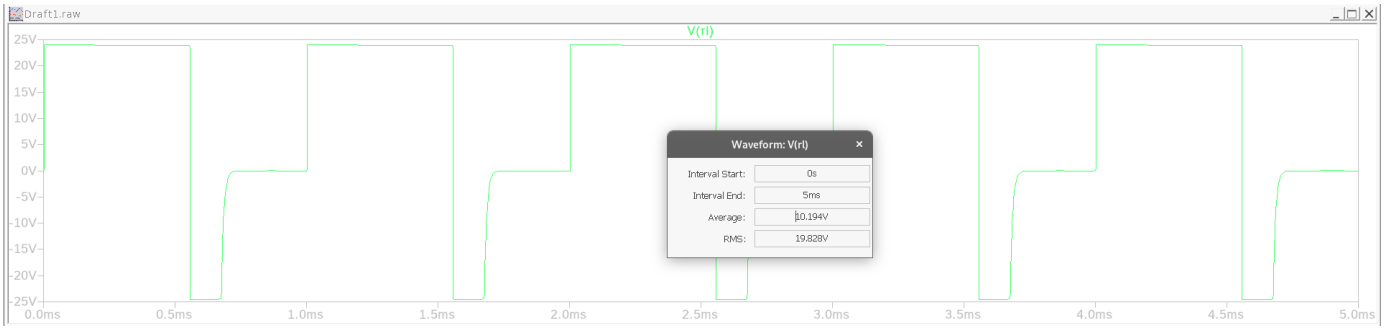


$D = 0.55$

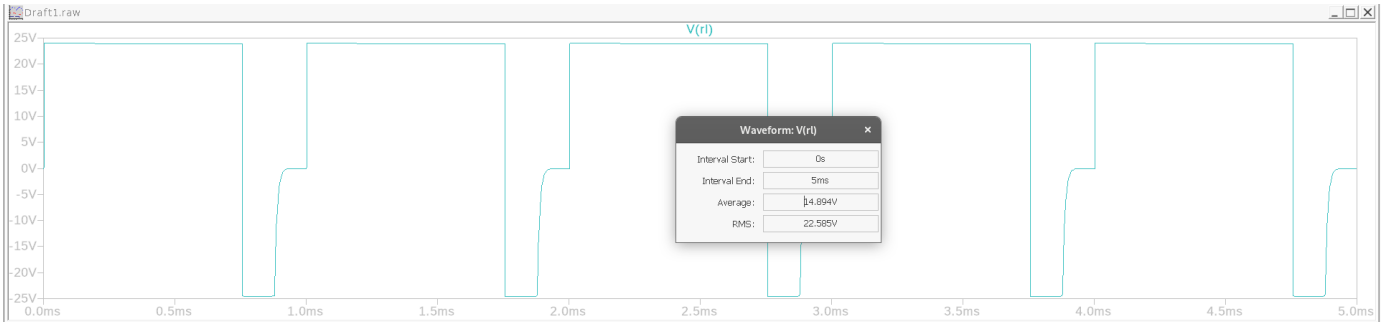


$D = 0.75$

What is the average voltage across the RL load?.



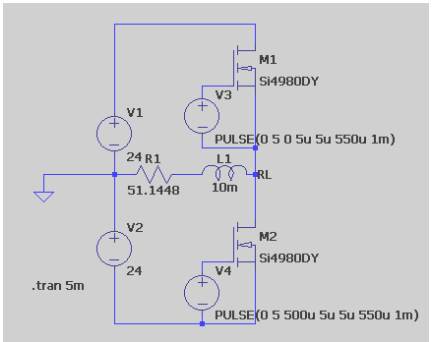
$D = 0.55$



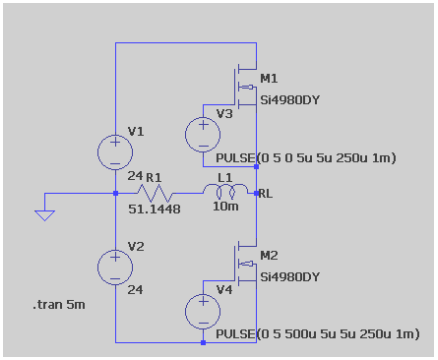
$D = 0.75$

Question 6 - Bipolar switching RL load

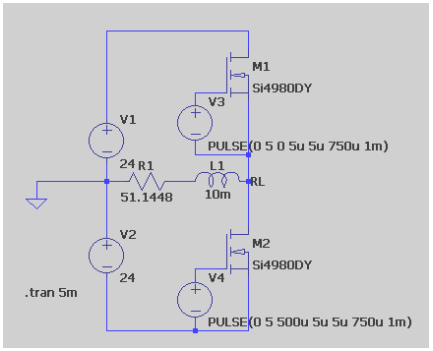
$R1 = \frac{511448}{10000} = 51.1448\Omega$



$D = 0.55$

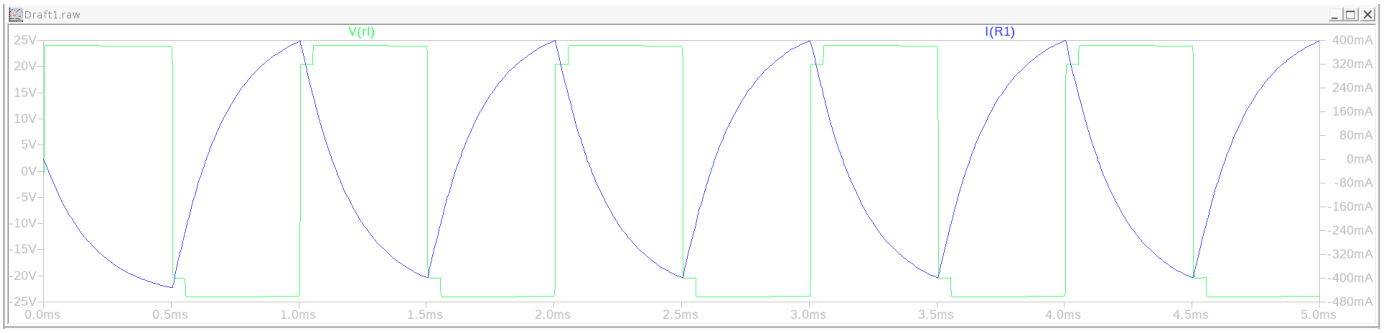


$D = 0.25$

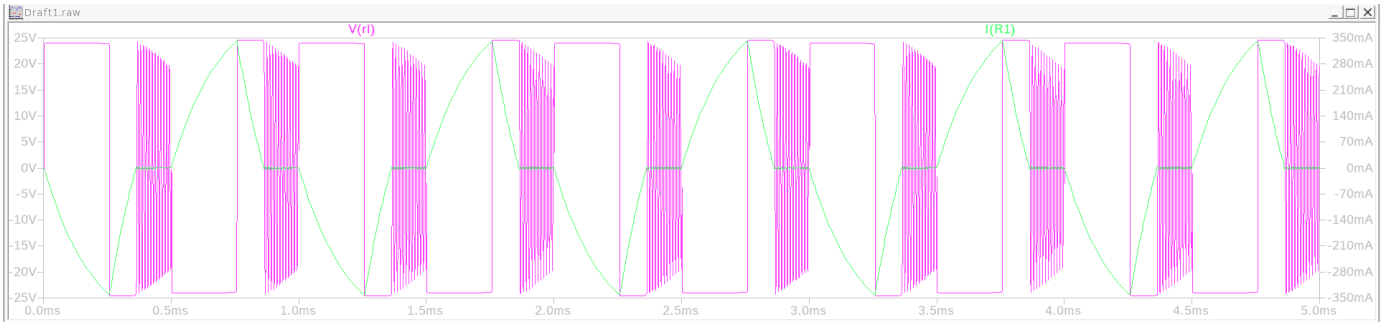


$D = 0.75$

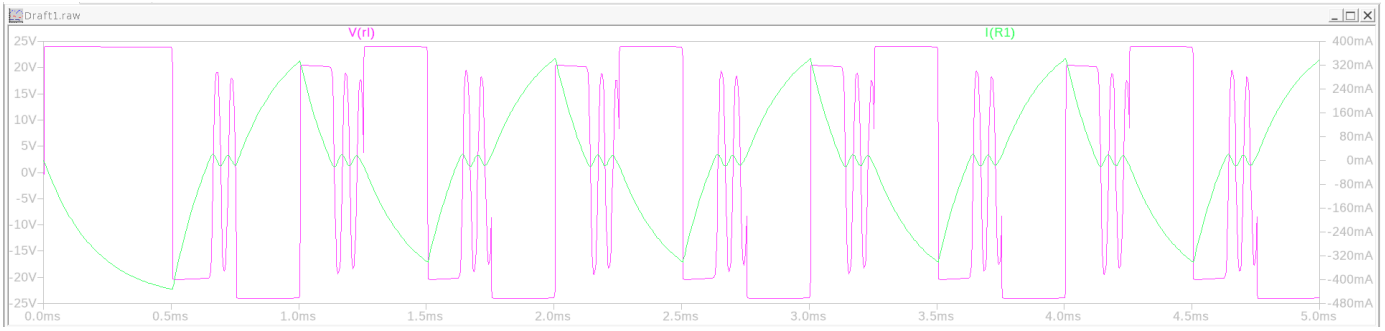
Show in a simulation the voltage across and current through the RL load.



$D = 0.55$

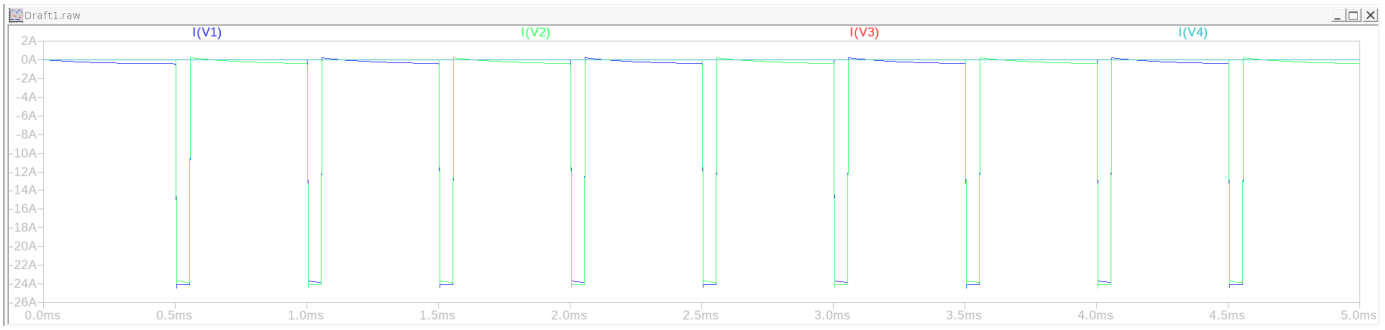


$D = 0.25$

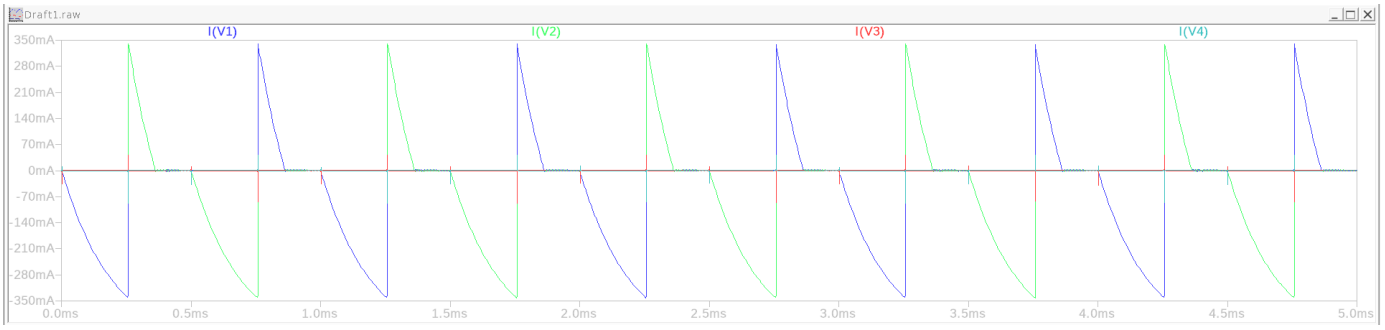


$D = 0.75$

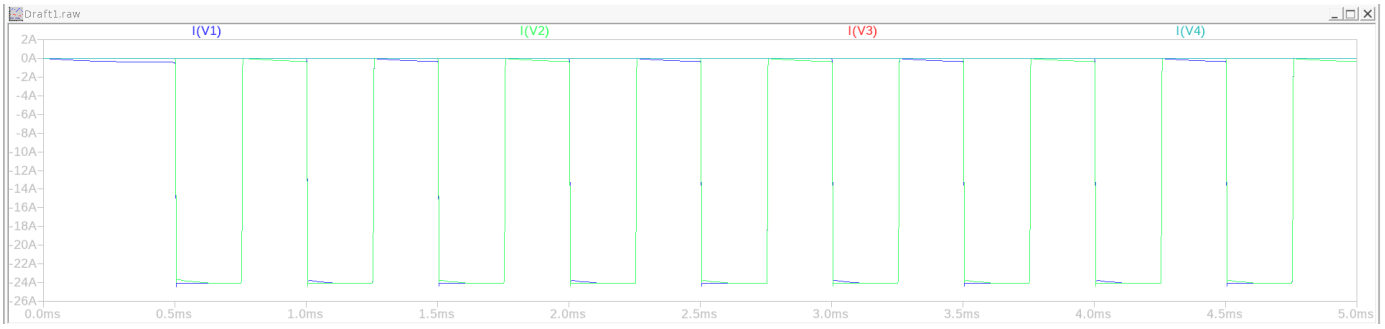
Show in a simulation the source currents.



$D = 0.55$

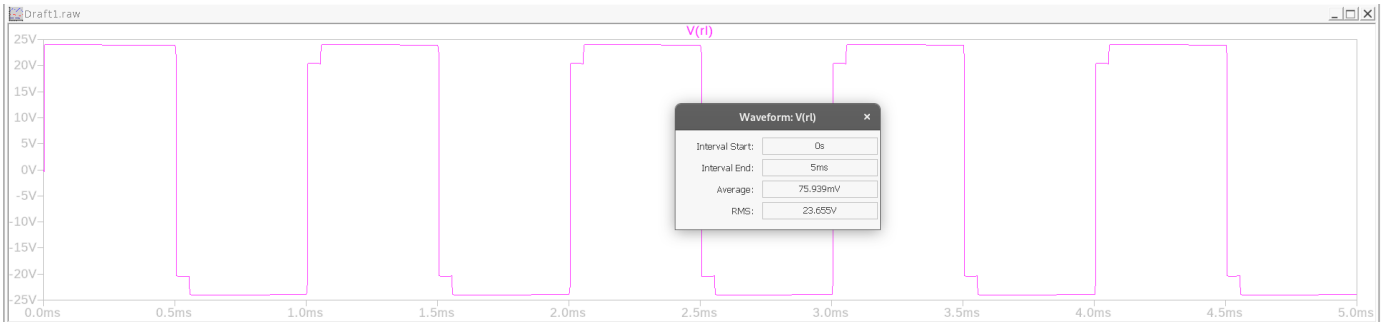


$D = 0.25$

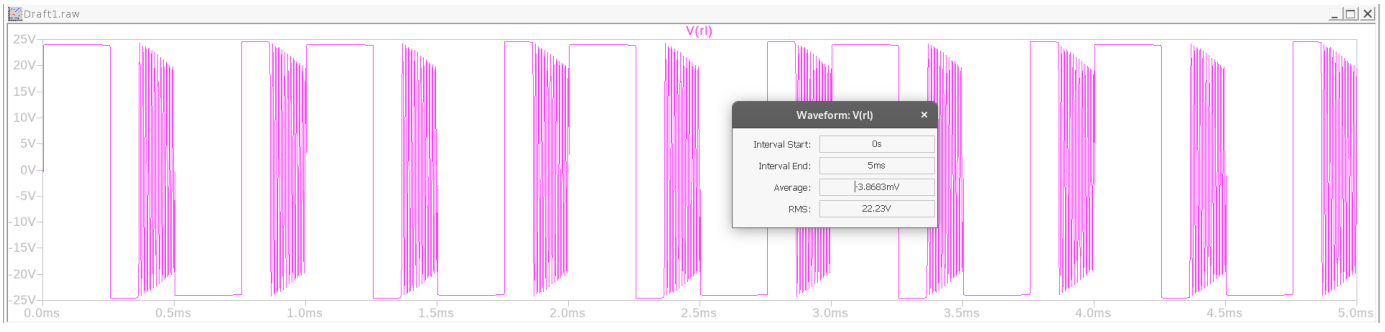


$D = 0.75$

What is the average voltage across the RL load?.



$D = 0.55$

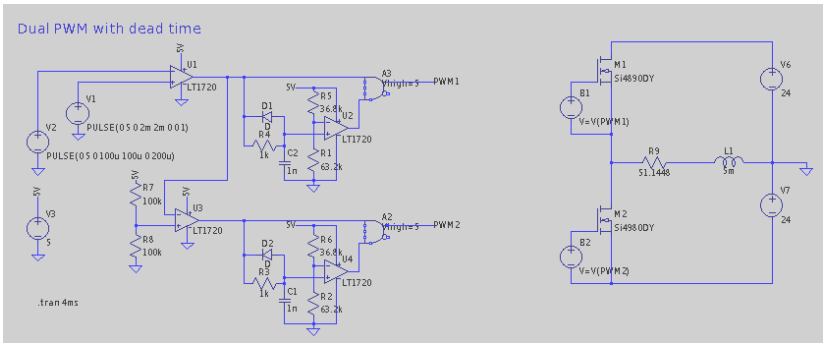


$D = 0.25$

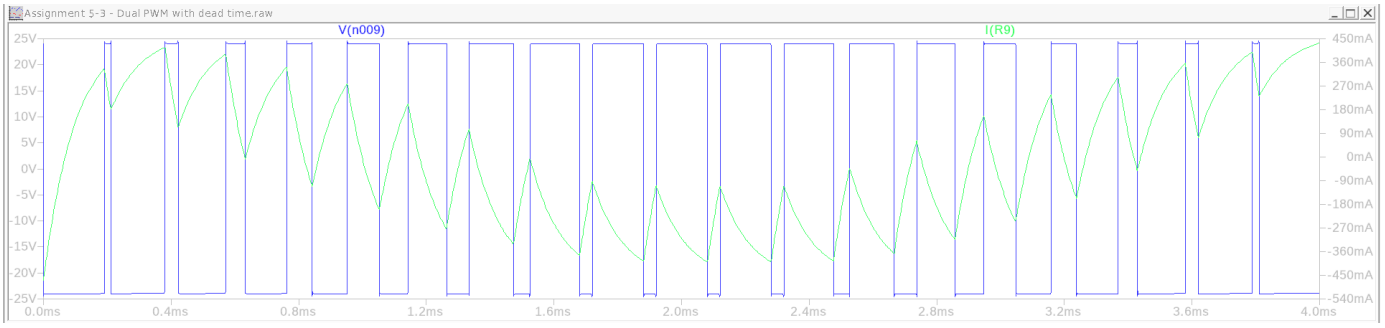
$D = 0.75$

Question 7 - PWM for half bridge

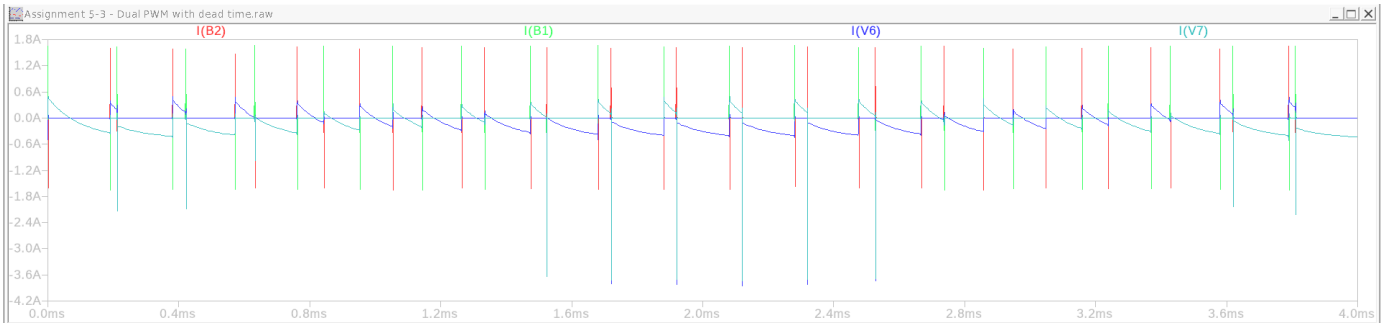
$R1 = \frac{511448}{10000} = 51.1448\Omega$



Show in a simulation the voltage across and current through the RL load.



Show in a simulation the source currents.



What is the average voltage across the RL load?.