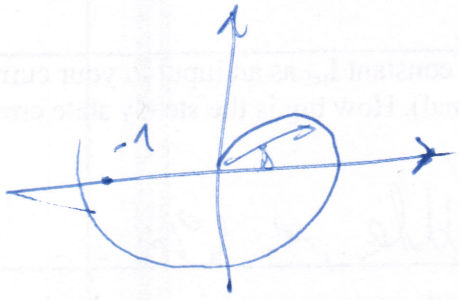
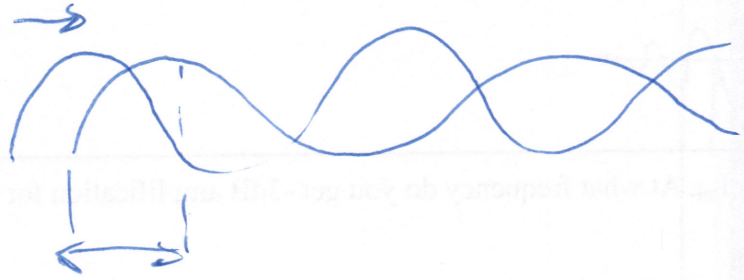
$I_{ref} + eP$ $\quad 0 - 100$

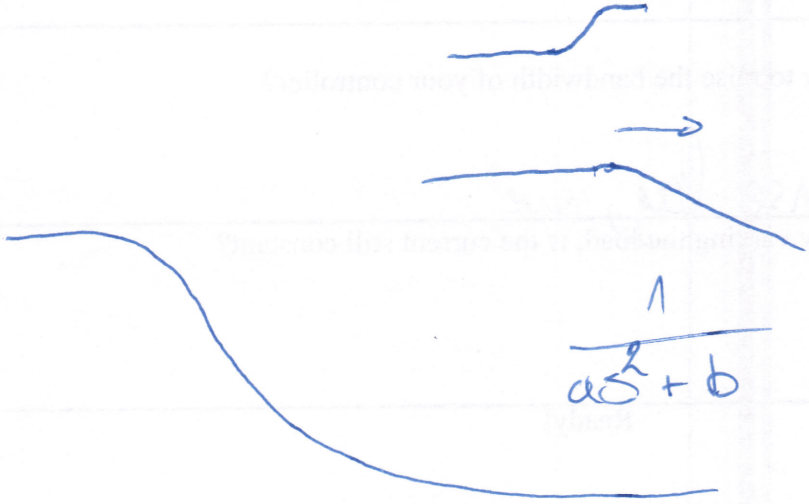
50

$$PWM = \frac{1}{I_{ref} + eP}$$

I_{ref}
$V_{in} \rightarrow I_{in}$ $\Big\}$ eP







$$\frac{1}{as^2 + b} + \log(t) - 2\log(n)$$

5. You may signal condition the signal with digital filters in your controller. How would you suggest doing that? In next lab you are going to use this signal as feedback signal for a current controller you are going to implement. Therefor you cannot have too much phase delay on your current signal.

Use a low order filter

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6. If you think you need a digital filter you should have it implemented for lab 5. Phase delay is always bad for controll issues...

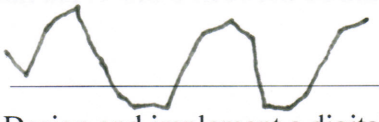
Done!

för hög resistans i filter avvägning mellan ström och spänningsfall

6.Use the active first order filter. Use the same cutoff frequency for this filter as before. Do not connect it to your microcontroller yet! Try it with sinusoidal input and look for the cutoff frequency with an oscilloscope.

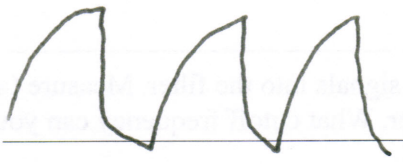
$f_c = 6{,}3\,kHz$

7.As an extra safety (If you are not 100% sure of voltage level 0-3,3V) you may attach a zenerdiode to the output of the amplifier. Use the right voltage and direction for the zener. Connect the active filter to your controller. Use a frequency generator, with the same frequency and amplitude as in 3, as input. What amplitude do you get compared to the passive filter.



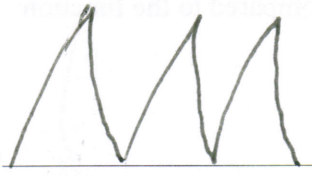
≈ Same as earlier
1.95 - 0.98

8. Design and implement a digital lowpass filter with cutoff frequency of 200 Hz. You will have good usage of the filter-lecture material. Make sure you have the right voltage levels 0-3,3 V from a frequency generator and use a square wave of 100 Hz as output.
What will you see in the plot?



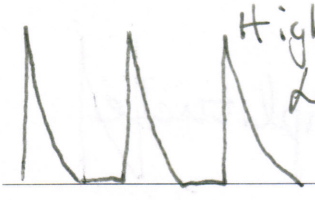
High: 1,92
Low: 0.95

9. Make a second order digital lowpass filter with 200 Hz of cutoff frequency. Use 100 Hz square wave as input signal.
What are you seeing in the plot?

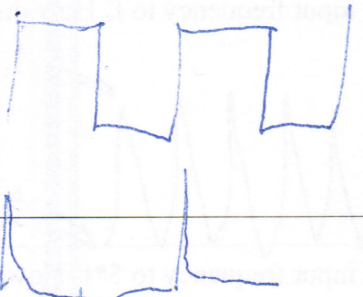


High: 1.65
Low: 1.3

10. Design a highpass filter with cutoff frequency of 600 Hz. Use the same input as before. What will you see now?



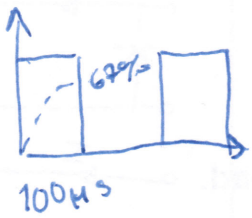
High: 0.7
Low: 0



This it it!

This time I know it's the real thing

Ska vara så, pga char in i MatLab



8. Control motor 1 with the H-bridge. Motor 2 should be used as a generator. Put a power resistor between the two (motor 2) connectors. The energy will dissipate trough the resistor. Use the same connection as in 7 for the control pins. Measure the current trough the motor. Do this over the R_s. You can try different dutycycles. How does the current look like for different directions 25 and 75 % dutycycle?

25% => 124 mA 12 V

75% => 115 mA 12 V

9. Use 1 kHz frequency and 50% dutycycle. Look at the current trough the motor by measuring the voltage drop over R_s. What peak to peak value do you get for the current? Is the motor getting hot?

50%, 1kHz, 12 V => 1A

10. What inductance and resistance has your motor? What τ do your motor have? Compare that to your cycletime divided by 2. Comments? Chose a PWM frequency that you think will work. What peak to peak value do you get now at 50% dutycycle?

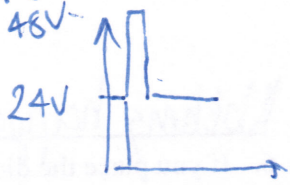
22,1 Ω , 2,05 mH => $\frac{L}{R} = \frac{2,05\,m}{22,1} \approx 0,0001\,s$

$T = 10\,kHz$

11. Back to the solenoid. Can you think of any way to get a faster response from it?

$T = \frac{L}{R}$ Decrease L or increase R

Start with higher voltage



Extra, if you have time and are not exhausted:

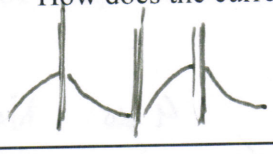
Use the mode pin and change between fast and slow current decay mode. Measure the current, what differences do you get.

Ready!

8. What efficiency do you get? Half load.

$\frac{UI^2}{UI^2} = \frac{P_{ut}}{P_{in}} = 93\%$

9. Put a small (somewhere 1 ohm) resistor in series with the input voltage. How does the current look like? Use the oscilloscope to view it.



10. Connect a given micro controller board to your LM 317 regulator. Be aware of what voltage out you have and what voltage the controller can take. Does the controller work?

Yes!

11. Induce an Electro Static Discharge in the wires between the power supply and your regulator. What happens with the microcontroller?

It stops

12. Will your voltage regulator withstand an opposite polarity on the input side? Just give the theoretical answer.

No

13. If your answer is no in 12, answer why it is like that

Cap is polarized

Good luck!

Done