

Lab 8: The RC Filter

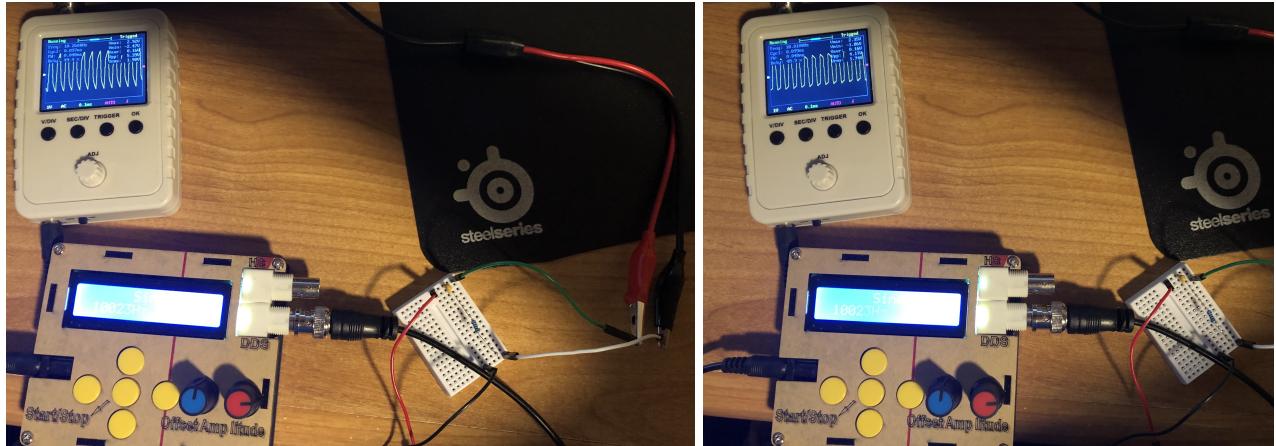
Philip Kim

April 13, 2021

Table 1: High-Pass Filter

f_{gen}	f_{osc}	C	R	V_{RC}	V_R	V/DIV for V_R	$ H_{exp} $	$ H_{the} $
10kHz	10.010kHz	$0.22\mu F$	100Ω	1.90V	1.74V	1V	0.8969	0.8105
5kHz	5.133kHz	$0.22\mu F$	100Ω	1.98V	1.33V	1V	0.6717	0.5787
2kHz	2.222kHz	$0.22\mu F$	100Ω	2.14V	0.77V	1V	0.3598	0.2936
1kHz	1.025kHz	$0.22\mu F$	100Ω	2.10V	0.40V	1V	0.1905	0.1403
15kHz	15.143kHz	$0.22\mu F$	100Ω	1.78V	1.90V	1V	0.9368	0.9023
20kHz	20.029kHz	$0.22\mu F$	100Ω	1.86V	1.78V	1V	0.9570	0.9405
30kHz	30.024kHz	$0.22\mu F$	100Ω	1.82V	1.78V	1V	0.9780	0.9722
40kHz	40.029kHz	$0.22\mu F$	100Ω	1.74V	1.70V	1V	0.9770	0.9841

High-Pass Filter Setup



High-Pass Filter Graph

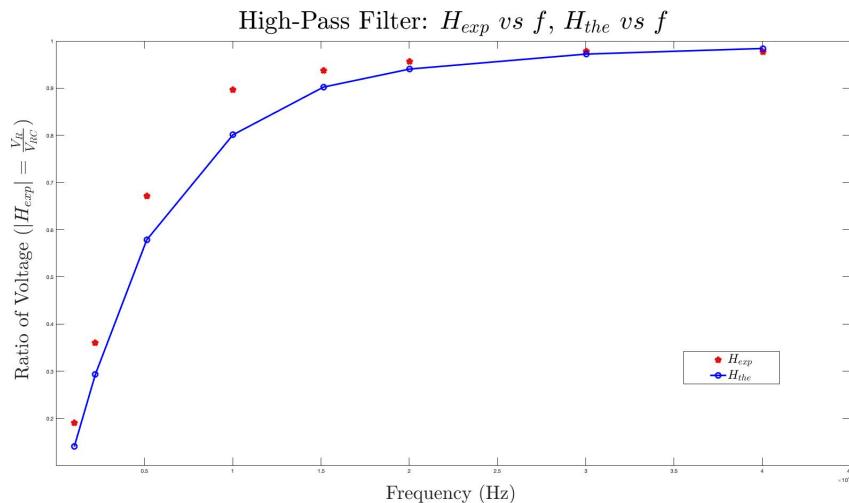
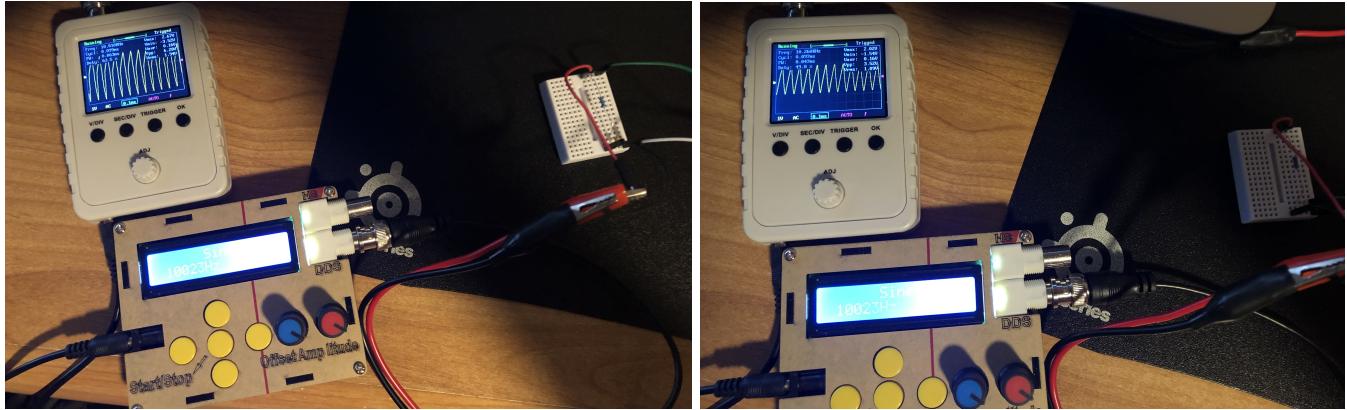


Table 2: Low-Pass Filter

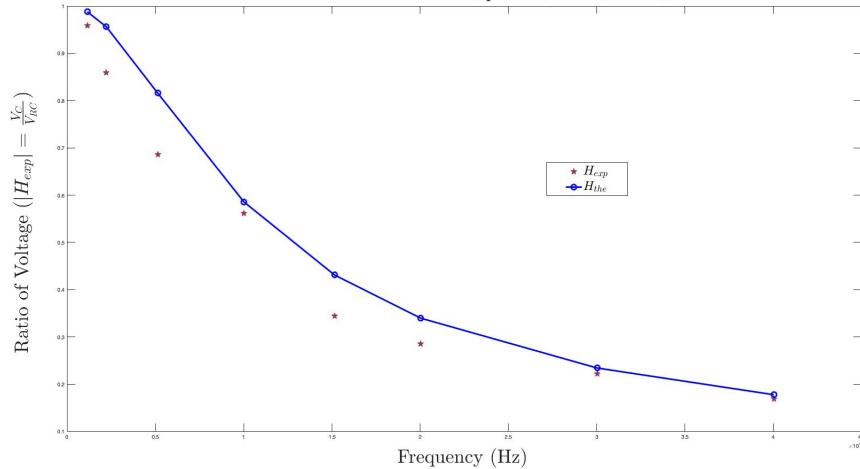
f_{gen}	f_{osc}	C	R	V_{RC}	V_C	V/DIV for V_C	$ H_{exp} $	$ H_{the} $
10kHz	10.010kHz	$0.22\mu F$	100Ω	1.94V	1.09V	1V	0.5619	0.5857
5kHz	5.133kHz	$0.22\mu F$	100Ω	1.94V	1.33V	1V	0.6856	0.8156
2kHz	2.222kHz	$0.22\mu F$	100Ω	1.98V	1.70V	1V	0.8586	0.9559
1kHz	1.138kHz	$0.22\mu F$	100Ω	1.94V	1.86V	1V	0.9588	0.9879
15kHz	15.143kHz	$0.22\mu F$	100Ω	1.86V	0.64V	1V	0.3441	0.4311
20kHz	20.029kHz	$0.22\mu F$	100Ω	1.82V	0.52V	1V	0.2857	0.3397
30kHz	30.019kHz	$0.22\mu F$	100Ω	1.70V	0.36V	1V	0.2218	0.2343
40kHz	40.029kHz	$0.22\mu F$	100Ω	1.66V	0.28V	1V	0.1687	0.1778

Low-Pass Filter Setup



Low-Pass Filter Graph

Low-Pass Filter: H_{exp} vs f , H_{the} vs f



1. Compare the theoretically obtained curves with the experimentally determined curves and quantify any difference. What do you think this difference is due to?
 - High-Pass Filter: H_{the} curve is below H_{exp} symbols because the high pass filter only allows high frequency signals from its cut-off frequency, f_C point and higher to infinity to pass through while blocking those any lower.
 - Low-Pass Filter: H_{the} curve is above H_{exp} symbols because the low pass filter only allows low frequency signals from 0Hz to its cut-off frequency, f_C point to pass while blocking those any higher.