

Lab 6: The Impedance of Capacitors

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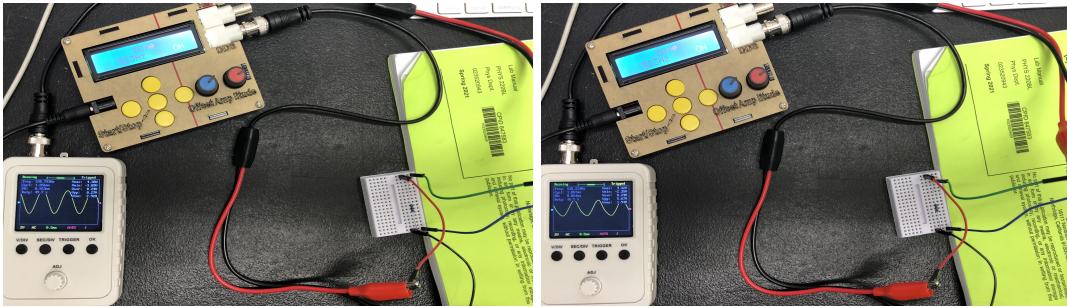
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Part 1

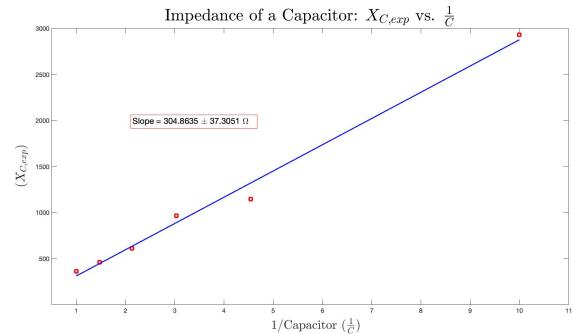
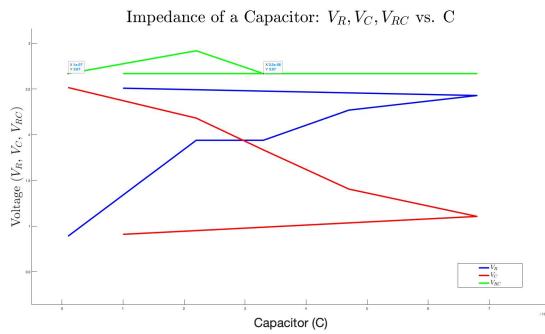
Table 1: Impedance of a Capacitor

C	R	V_{RC}	V_R	V/DIV for V_R	f_{gen}	f_{osc}	I_R	V_C	$X_{C,exp}$	$X_{C,\text{the}}$
$0.22\mu F$	$1k\Omega$	2.92V	1.94V	2V	523Hz	538.793Hz	0.0019	2.1824	1148.6Ω	1342.2Ω
$0.33\mu F$	$1k\Omega$	2.67V	1.94V	2V	523Hz	538.793Hz	0.0019	1.8345	965.5Ω	894.8Ω
$0.10\mu F$	$1k\Omega$	2.67V	0.89V	2V	523Hz	538.793Hz	0.00089	2.5173	2828.4Ω	2952.8Ω
$0.47\mu F$	$1k\Omega$	2.67V	2.27V	2V	523Hz	538.793Hz	0.0023	1.4057	611.2Ω	629.4Ω
$0.68\mu F$	$1k\Omega$	2.67V	2.43V	2V	523Hz	538.793Hz	0.0024	1.1063	461.0Ω	435.0Ω
$1.00\mu F$	$1k\Omega$	2.67V	2.51V	2V	523Hz	538.793Hz	0.0025	0.9104	364.2Ω	295.8Ω

Picture R_{RC} & R_c



Graph 1 & Graph 2



Discussion 1

- What slope do you find for graph 2 and how does it compare to your expectation?
 - Slope is 304.9 and the expected slope is 295.5 which is only 3.13% difference.
- What does a deviation from the linear fit indicate? How would you correct for the ones with the largest error?
 - These deviation indicates that the capacitors are not accurate as mentioned in the manual. Replacing capacitors with better capacitors would be the obvious option, but in our case we can calculate the theoretical and adjust the amplitude to reach a closer approximation to the theoretical value.