

Source: 2020PHYS201/KBe20phys250retCapacitorsLab.md

#ret #disorganized #incomplete

1 | Introduction

The purpose of this lab is to verify the relation between capacitance, resistance, voltage, and charge time of a simple capacitor circuit. The equation that will be verified is

$$V_{cap} = V_{bat} \left(1 - e^{-\frac{t-t_0}{\tau}} \right)$$

2 | Charging Capacitors

2.1 | Voltage over Time

2.2 | Charge Stored

3 | Time Constant with Various Components

Most of the analysis for data collected as a class was done on the “charge rate constant” (time/RC) of each circuit, defined as:

$$\frac{t}{RC}$$

time/RC is a unitless scalar that represents how quickly it takes to charge any capacitor for a given voltage. Voltage data was not collected during the experiment, so the voltage is assumed to be constant across trials. If our model of capacitor charge rate is correct, we expect time/RC to be constant across trials. The actual data was skewed left:
