MP309

Experiment 10

Capacitative Rectification

Name :- Patel Mihir Hemantkumar

Roll no. :- I18PH037

List of Figures

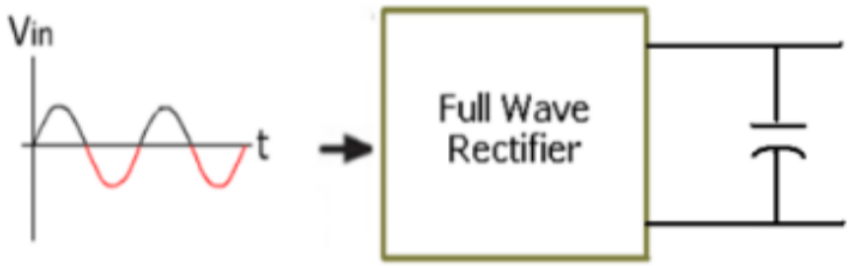

Figure 1: Filtering

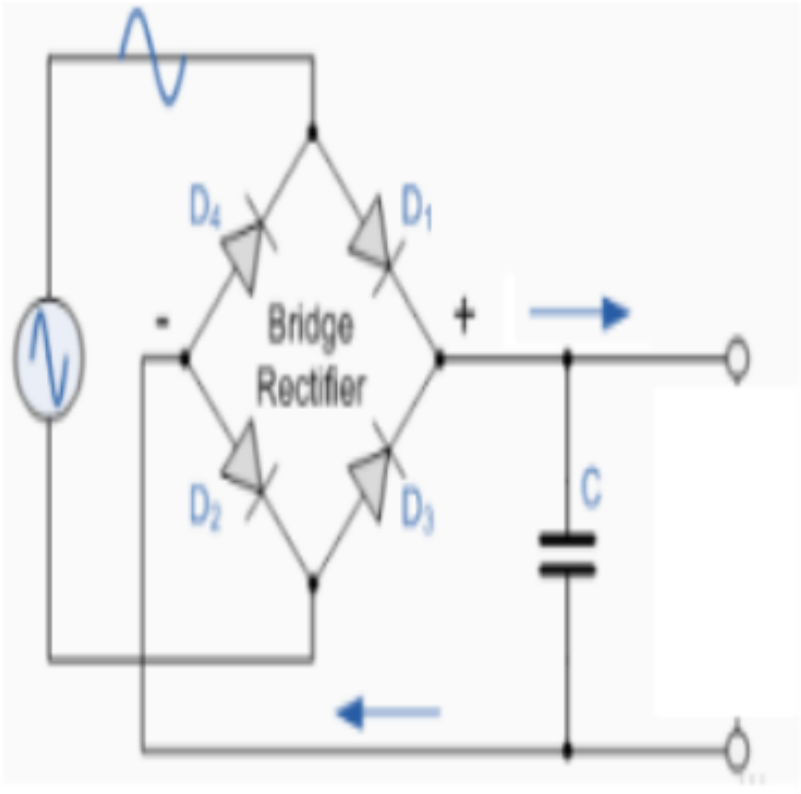

Figure 2: Full Wave Rectification with Filtering

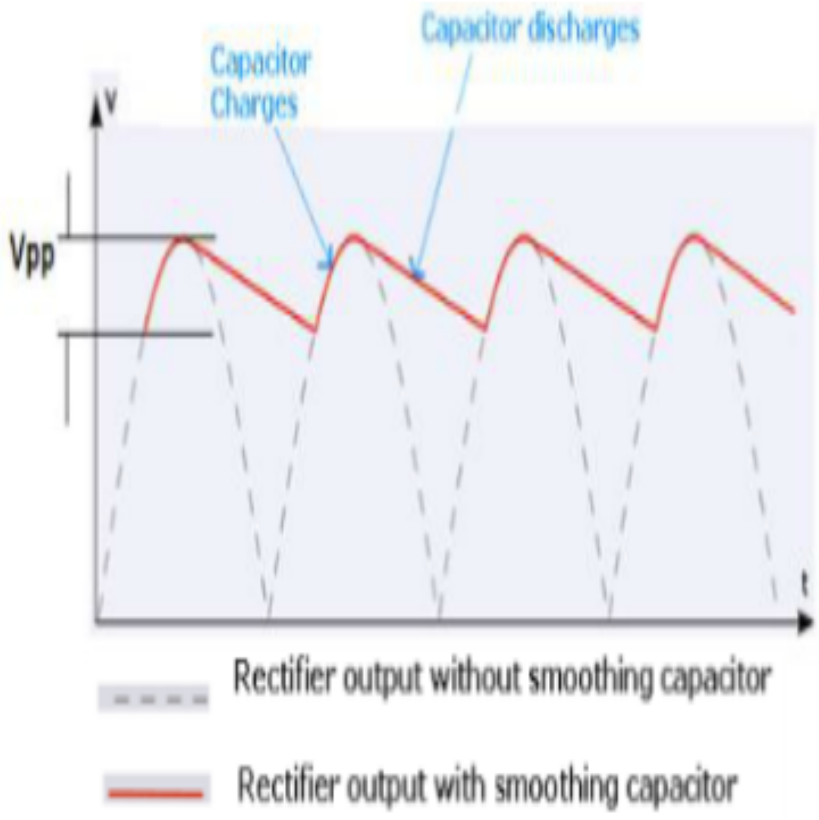

Figure 3: Ripple Voltage and Ripple Factor

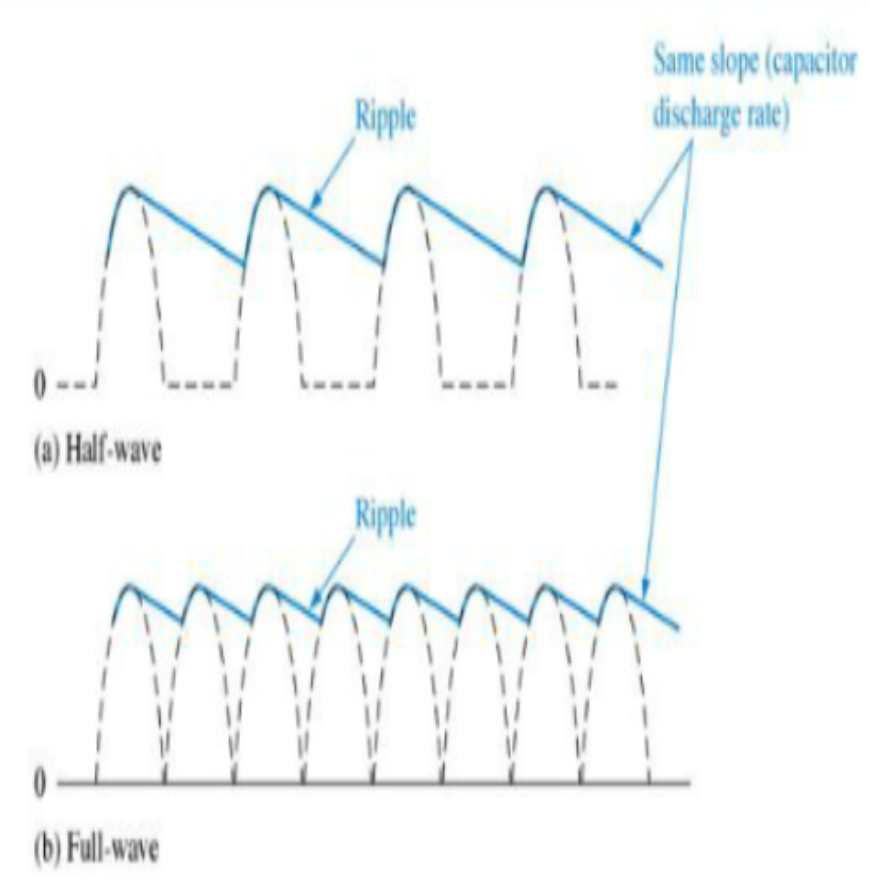

Figure 4: Half Wave vs Full Wave Capacitive Rectification

Capacitative Rectification for Half Wave Rectifier

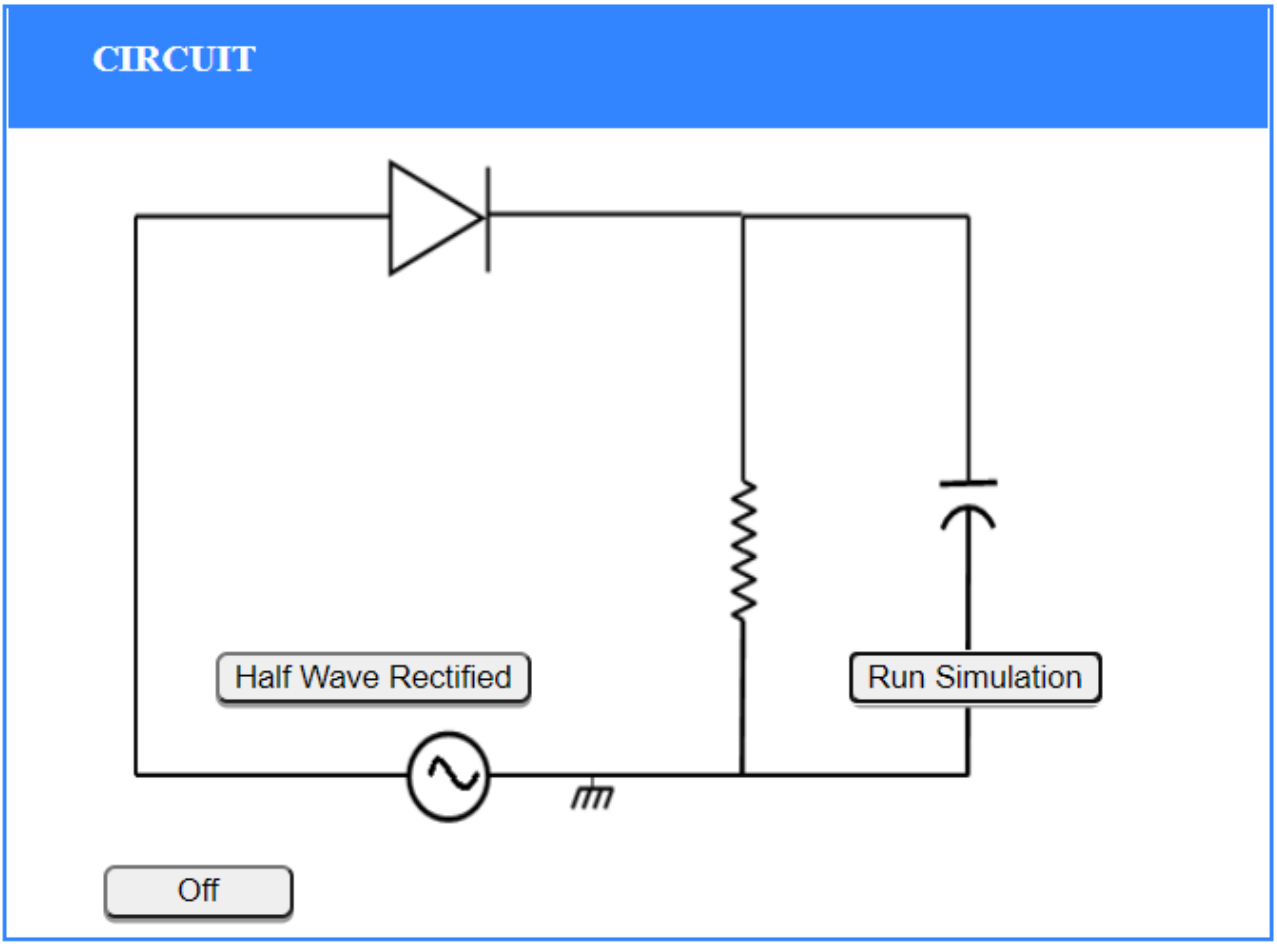

Figure 5: Half Wave Circuit

Parameters

1. Load Resistance (R): - 1KΩ
2. Capacitance (C): - 102μF
3. AC source: - 50Hz, 2V
4. Channel 1 Input Waveform (in Volt/div): - 1V/div
5. Channel 2 Output Waveform (in Volt/div): - 1V/div
6. Sine wave is used.

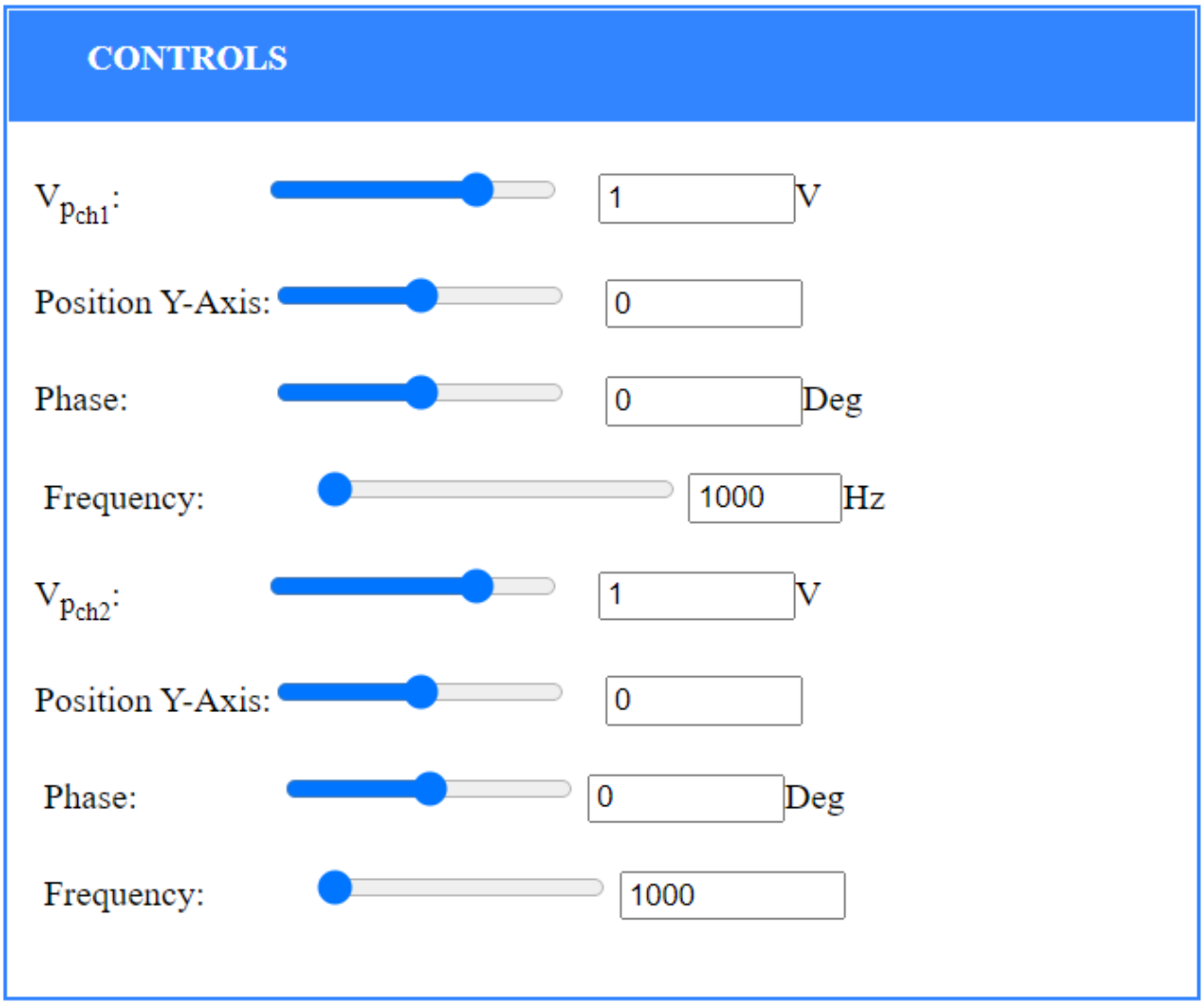

Figure 6: Half Wave Controls

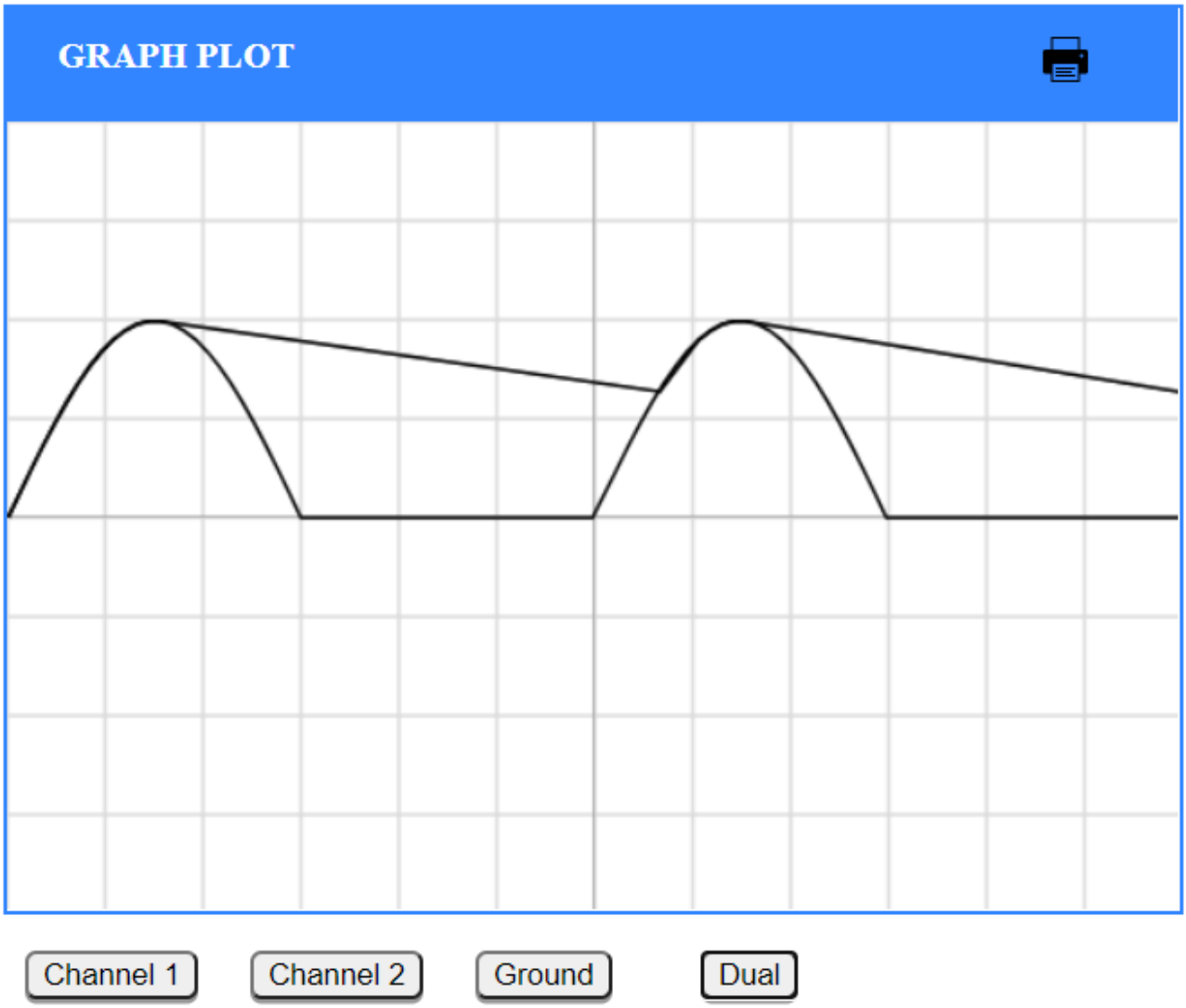

Figure 7: Capacitative Rectification for Half Wave Rectifier Graph

CALCULATION

Measure the V_m

$$V_{rms} = \frac{V_m}{\sqrt{2}}$$

$$V_{dc} = \frac{V_m}{\pi}$$

Ripple Factor$=\frac{V_{ac}}{V_{dc}}$ Since, $V_{ac} = \frac{\sqrt{(V_{rms}^2 - V_{dc}^2)}}{V_{dc}}$

Figure 8: Half Wave Capacitive Rectifier Calculations

Capacitative Rectification for Full Wave Rectifier

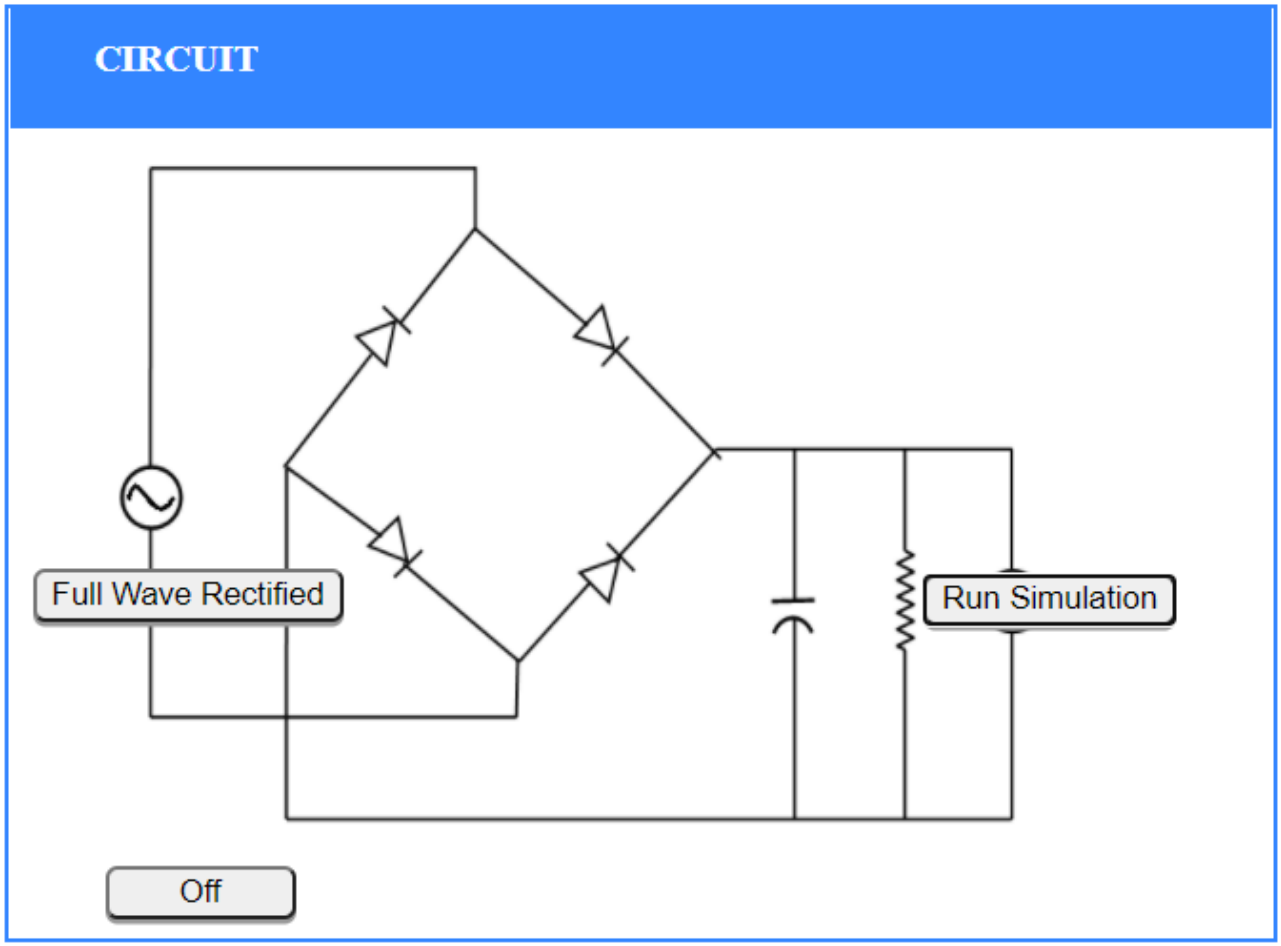

Figure 9: Full Wave Circuit

Parameters

1. Load Resistance (R): - 1KΩ
2. Capacitance (C): - 102μF
3. AC source: - 50Hz, 2V
4. Channel 1 Input Waveform (in Volt/div): - 1V/div
5. Channel 2 Output Waveform (in Volt/div): - 1V/div
6. Sine wave is used.

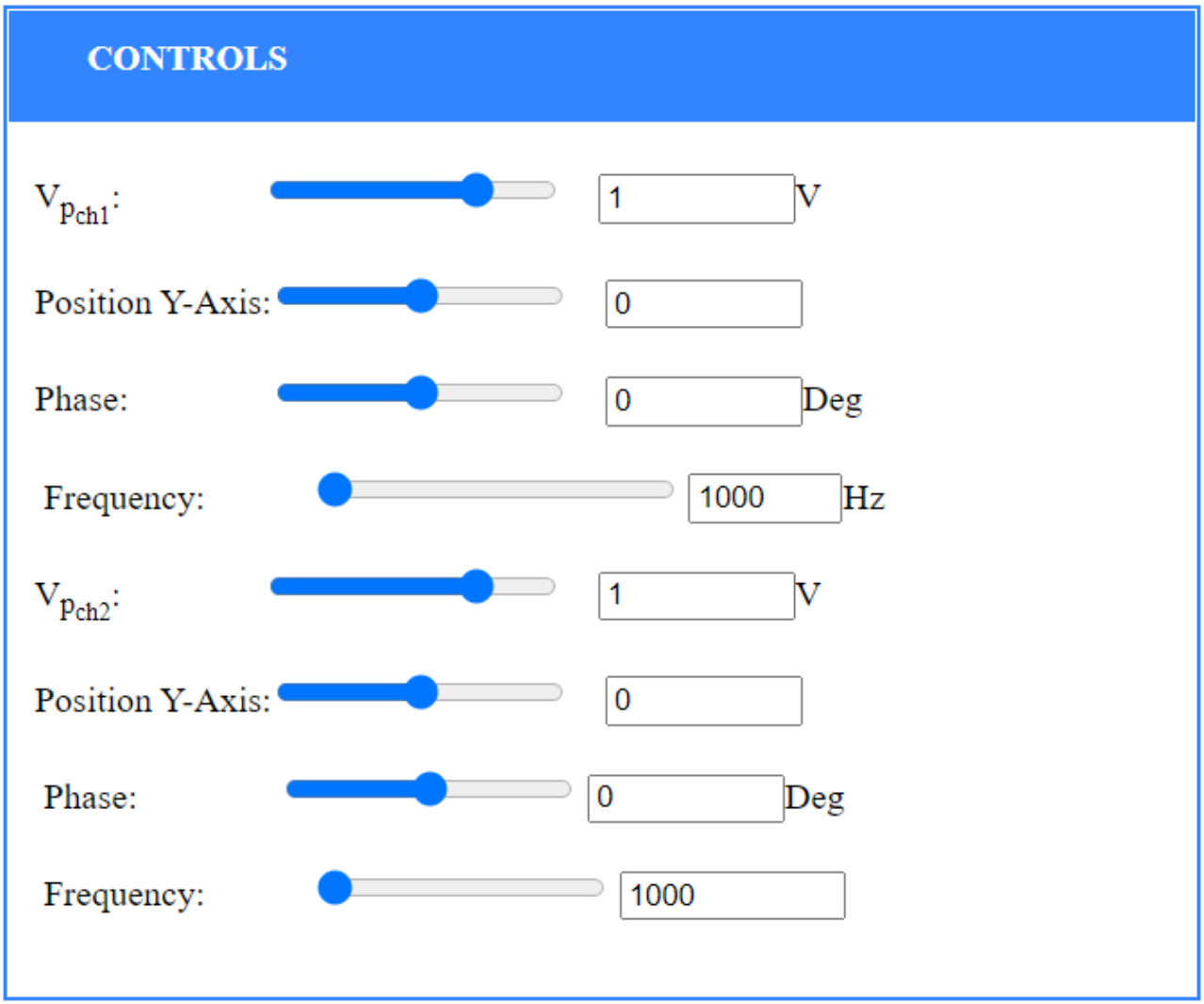

Figure 10: Full Wave Capacitive Rectifier Controls

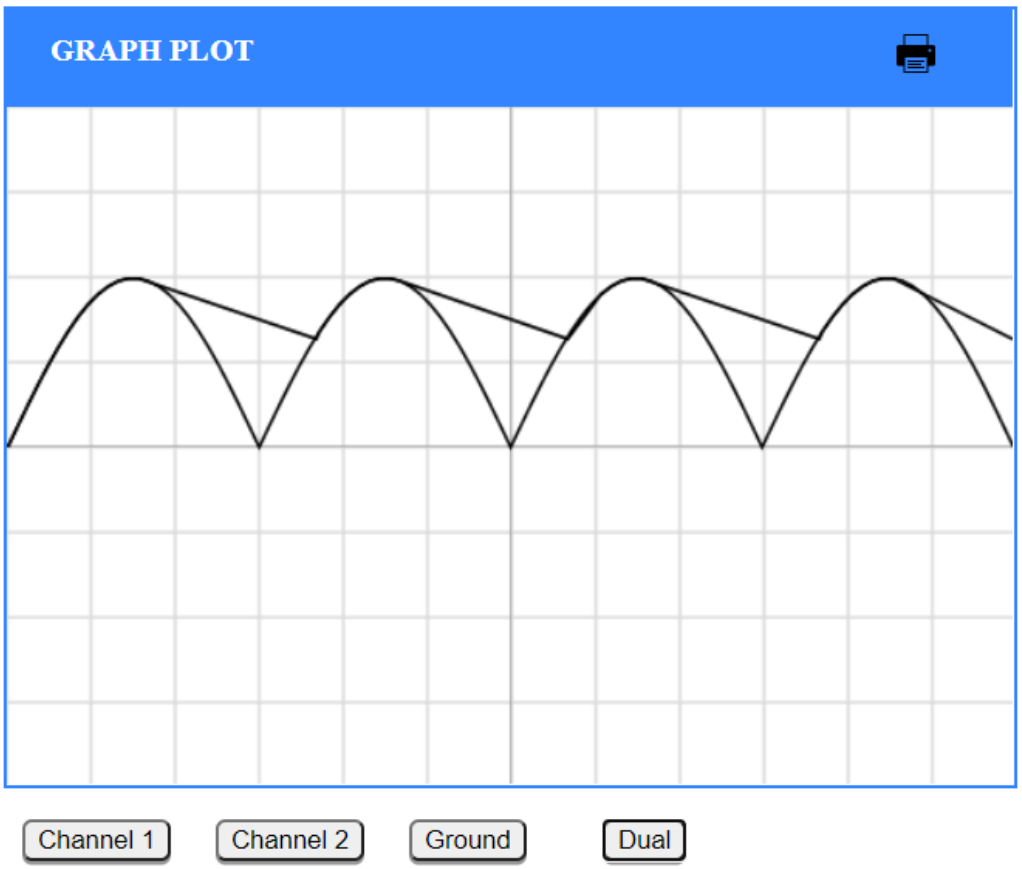

Figure 11: Full Wave Capacitive Rectifier Graph

Calculation

(1)C=100 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.029$

(2) C=500 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0058$

(3) C=1000 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0029$

(4) C=1500 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} =$0.0019

(5) C=2000 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0014$

(6) C=2500 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0012$

(7) C=3000 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0010$

(8) C=3500 μF , $f = 50Hz$, $R_L = 1K\Omega$
Ripple Factor,r = $\frac{1}{4\sqrt{3}fR_LC} = 0.0008$

Figure 12: **Graph for Capacitance v/s Ripple Factor**