Department of Electrical and Computer Engineering

University of Victoria

ELEC 300 - Linear Circuits II

Laboratory Report

Experiment No.:	2
Title:	Frequency response of linear systems
Date of experiment:	19 February, 2016
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1 Objective

This experiment will create a type of RC circuit called a *phase lag circuit*. The circuit's transfer function will be used to determine the component values in the circuit for pre-defined frequency responses. The magnitude and phase responses of the circuit will be examined for a range of input frequencies.

2 Introduction

$$H(s) = K\frac{s-z}{s-p} \tag{1}$$

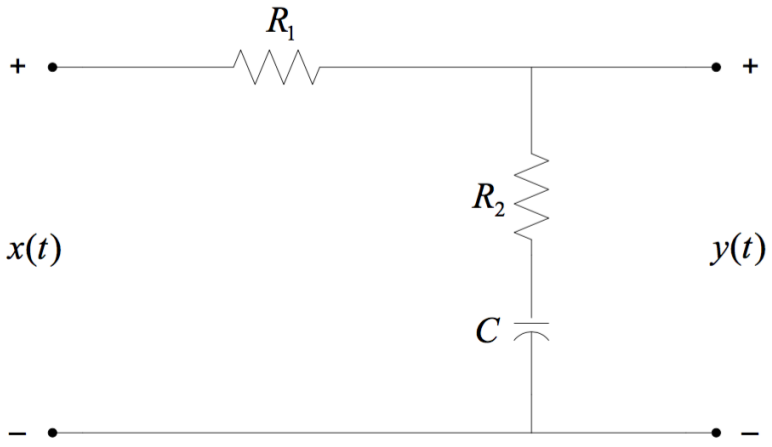

Figure 1: Schematic of a phase lag circuit

For the circuit in Fig. 1, the transfer function is:

$$H(s) = \frac{R_2 + \frac{1}{sC}}{R_1 + R_2 + \frac{1}{sC}} = \frac{R_2}{R_1 + R_2}\frac{s + \frac{1}{CR_2}}{s + \frac{1}{C(R_1+R_2)}}. \tag{2}$$

Comparing (1) with (2) gives:

$$\begin{aligned} K &= \frac{R_2}{R_1 + R_2} \\ |z| &= \frac{1}{CR_2} \\ |p| &= \frac{1}{C(R_1 + R_2)}. \end{aligned}$$

3 Results

$$|H(j\omega)|_{dB} = 20 \times \log\left(\frac{V_y}{V_x}\right) \tag{3}$$

$$\phi_{lag} = \phi_x - \phi_y$$

f (Hz)	V_y (V)	$\lvert H(j\omega)\rvert_{dB}$	ϕ_{lag} (°)

Table 1: Response of Fig. 1 to frequency change ($V_x = 5\,\mathrm{V}$)

4 Discussion

5 Conclusion

Justify conclusions and results.