

## Lab Experiment #7:

# Oscilloscope

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PHYS 200BL 10/25/2021

## **Data**

## Scope setup

Timebase (s/ div)	T (div)	T (s)	Chan. 1 scale (V\ div)	V <sub>m</sub> (div)	V <sub>m</sub> (V)
$1\frac{\mathrm{ms}}{\mathrm{div}}$	0.6 div	$0.6  imes 10^-3~\mathrm{s}$	$1\frac{ m V}{ m div}$	2 div	2 V
$0.5rac{ ext{ms}}{ ext{div}}$	1.25 div	$0.625 imes 10^-3~\mathrm{s}$	$1 rac{ m V}{ m div}$	2 div	2 V
$0.1 rac{ m ms}{ m div}$	6.3 div	$0.63 imes$ $10^-3~\mathrm{s}$	$1\frac{ m V}{ m div}$	2 div	2 V
$0.1rac{ m ms}{ m div}$	6.4 div	$0.64 imes$ $10^-3~\mathrm{s}$	$2rac{ m V}{ m div}$	1 div	2 V
$0.1 rac{ m ms}{ m div}$	6.35 div	$0.635 imes$ $10^-3~\mathrm{s}$	$0.5rac{ m V}{ m div}$	4 div	2 V

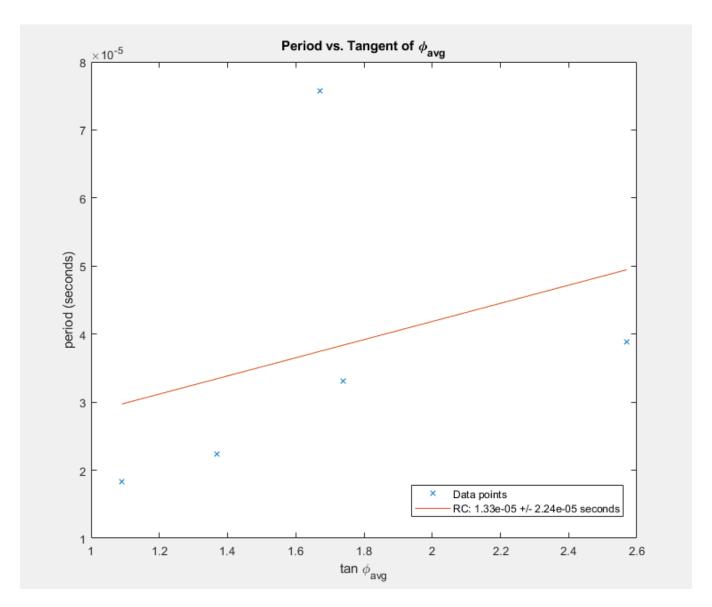
The values of the period T compared to the voltage V remain fairly constant: there is no significant quantitative change in voltage vs. time as the scale definitions are changed.

## **Circuit measurements**

Set frequency f <sub>s</sub>	ΔΤ	Т	V <sub>m, bc</sub> (div)	V <sub>m, ac</sub> (V)
1000 Hz	$0.25~{ m div}  imes 0.0002 rac{ m s}{ m div} = 5  imes 10^{-5}~{ m s}$	$4.8  ext{ div}  imes 0.1  ext{ms}{ ext{div}} = 4.8  imes 10^{-4}  ext{ s}$	$0.8  ext{ div}  imes 0.5 rac{ ext{V}}{ ext{div}} = 0.4  ext{ V}$	$egin{array}{l} 2~\mathrm{div}  imes \ 1rac{\mathrm{V}}{\mathrm{div}} = \ 2~\mathrm{V} \end{array}$
2000 Hz	$egin{array}{l} 0.4~\mathrm{div} imes\ 0.1rac{\mathrm{ms}}{\mathrm{div}}=4 imes\ 10^{-5}~\mathrm{s} \end{array}$	$egin{array}{l} 2.4~{ m div}  imes \ 0.1 rac{ m ms}{ m div} = 2.4  imes \ 10^{-4}~{ m s} \end{array}$	$0.6  ext{ div}  imes 1 rac{ ext{V}}{ ext{div}} = 0.6  ext{ V}$	$egin{array}{l} 2~\mathrm{div}  imes \ 1rac{\mathrm{V}}{\mathrm{div}} = \ 2~\mathrm{V} \end{array}$
3000 Hz	$egin{array}{l} 0.3~\mathrm{div} imes\ 0.1rac{\mathrm{ms}}{\mathrm{div}}=3 imes\ 10^{-5}~\mathrm{s} \end{array}$	$egin{array}{l} 2.1~{ m div}  imes \ 0.1rac{{ m ms}}{{ m div}} = 2.1  imes \ 10^{-4}~{ m s} \end{array}$	$egin{array}{l} 0.7~\mathrm{div}  imes \ 1rac{\mathrm{V}}{\mathrm{div}} = \ 0.7~\mathrm{V} \end{array}$	$egin{array}{l} 2~\mathrm{div}  imes \ 1rac{\mathrm{V}}{\mathrm{div}} = \ 2~\mathrm{V} \end{array}$
4000 Hz	$egin{aligned} 0.3~ ext{div} imes\ 50rac{\mu ext{s}}{ ext{div}} = 1.5 imes\ 10^{-5}~ ext{s} \end{aligned}$	$egin{array}{l} 1.4~{ m div}  imes \ 0.1 { m ms \over  m div} = 1.4  imes \ 10^{-4}~{ m s} \end{array}$	$0.8  ext{ div}  imes 1 rac{ ext{V}}{ ext{div}} = 0.8  ext{ V}$	$egin{array}{l} 2~\mathrm{div}  imes \ 1rac{\mathrm{V}}{\mathrm{div}} = \ 2~\mathrm{V} \end{array}$
5000 Hz	$0.2~\mathrm{div}  imes 50 rac{\mu \mathrm{s}}{\mathrm{div}} = 1  imes 10^{-5}~\mathrm{s}$	$egin{array}{l} 2.3~{ m div}  imes \ 0.1 rac{\mu { m s}}{ m div} = 1.15  imes \ 10^{-4}~{ m s} \end{array}$	$egin{array}{l} 0.9 \ { m div}  imes \ 1 rac{{ m V}}{{ m div}} = \ 0.9 \ { m V} \end{array}$	$egin{array}{l} 2~\mathrm{div} imes\ 1rac{\mathrm{V}}{\mathrm{div}}=\ 2~\mathrm{V} \end{array}$

# **Calculations**

Set frequency f <sub>s</sub>	f <sub>exp</sub> (Hz)	$\phi_{ extsf{1}}$ (rad)	$\phi_{ extsf{2}}$ (rad)	$\phi_{avg}$ (rad)	tan $\phi_{avg}$
$1000~\mathrm{Hz}$	$2100 \mathrm{Hz}$	$1.4 \mathrm{\ rad}$	$0.65~\mathrm{rad}$	$1.03 \mathrm{\ rad}$	1.67
$2000~\mathrm{Hz}$	4100Hz	1.3 rad	1.1 rad	$1.2 \mathrm{\ rad}$	2.57
$3000~\mathrm{Hz}$	4800Hz	$1.2 \mathrm{\ rad}$	$0.90~\mathrm{rad}$	$1.05~\mathrm{rad}$	1.74
$4000~\mathrm{Hz}$	7100Hz	$1.2~\mathrm{rad}$	$0.67~\mathrm{rad}$	$0.94~\mathrm{rad}$	1.37
$5000~\mathrm{Hz}$	8700Hz	1.1 rad	$0.55~\mathrm{rad}$	$0.83~\mathrm{rad}$	1.09



From slope:  $RC=1.33 imes 10^{-5}~{
m seconds}$ 

From given values:  $RC = 5.94 imes 10^{-5} \ {
m seconds}$ 

## Data sheet + Quiz

#### 7.9 Data sheet

Name: DavidMcNeary Partner:	Date:	Instructor's initials:
Partner: Glerdylara	Group No:	

#### Data

Scope s

setup (7.0.1)					
Timebase	T	T	Ch1 scale	V <sub>m</sub>	V <sub>m</sub>
(s/DIV)	(DIV)	(s)	(V/DIV)	(DIV)	(V)
1 ms/DIV	0.6 DIV	\$\$10-35	1 V/DIV	2 DIV	ZV
.5 ms/DIV	1.25 DIV	0.625×1035	1 V/DIV	ZDW	ZV
.1 ms/DIV	6.3 DIV	0.63×10-35	1 V/DIV	ZDIU	2V
.1 ms/DIV	6.4 DIV	0.64×10-35	2 V/DIV	I DIV	ZV
.1 ms/DIV	6.35 DIV	0.635×10.35	0.5 V/DIV	4 DIV	2V

Compare your five entries in T(s) to each other. Compare your five entries in  $V_m(V)$  to each other. How are they related? Both T(s) and  $V_m(V)$  remain fairly constant; there is no significant charge in voltage vs. time as the scale of timbage or scale of Video is varied.

Circuit measurements (7.6.2)

Enter your measurements in the form "5.0 DIV x 1.0 V/DIV = 5.0 V", see template in first entry in

74 x0.1 25 the table.

the table.	0,0,0,2	L. 4 do l'aiv)		
Set frequency f <sub>s</sub>	AT 0.0002 5x10-5	T4.85 0.1MS	V <sub>m,bc</sub>	V <sub>m,ac</sub>
1000 Hz	.25 DIV x 1 s/DIV = 84 s	MARTINE BY	U.8DIUX .5 TIVO.4	DESCRIPTION OF THE PERSON NAMED IN COLUMN 2 IS NOT THE OWNER.
2000 Hz	0.4010x0.110-35=	ENGRADOS	0.6DIVX 1 YOU-0.6	Michigan Company (Company Company Comp
3000 Hz	03DIV×0.1×10-35/dW	2.121 850		2010×1/20=2V
4000 Hz	0.3DNx5045/AU	1.4x0.1 20		VZ=CIBI×VIOS
5000 Hz	0.20UX50uSlaw	2.3×5045/dw	0.9010×1/diu	ZDIVX19aw=ZV

#### Calculation

Calculate the following (section 7.8-2).

Make sure that  $\phi_1$  and  $\phi_2$  are in rads and are similar numbers.

Set frequency $f_s$	f <sub>exp</sub> (Hz)	$\phi_1$ (rad)	$\phi_2$ (rad)	φ <sub>av</sub> (rad)	$\tan \phi_{\rm av}$
1000 Hz	2100 Hz	1.4 red	0.65 red	1.03 red	1.67
2000 Hz	4100 Hz	1.3 red	1.1 rad	1.2 red	2.57
3000 Hz	4800 Hz	1.2 red	0.90 00	1.05 red	1.74
4000 Hz	7100 Hz	1.2 rad	0.67 red	0.94 red	1.37
5000 Hz	8700 Hz	1.1 rad	0.55 red	0.83 rod	1.09

Extract the following (section 7.8-3).

From slope:  $RC = 1.33 \times 10^{-5}$  From given values:  $RC = 5.94 \times 10^{-5}$  From given values: