

UNIVERSITY OF VICTORIA

ELEC 250

LINEAR CIRCUITS I

Lab 2 - Phasor Analysis

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1 Object

The object of the experiment can be copied from the manual:

- A list may be helpful
- It makes things look neater
- And requires less typing

2 Results

The results are basically an account of the experimental setup, methods of measurement and the results obtained. Simple circuit or block diagrams should be included in this section to explain the experimental procedure. The use of simple and clear diagrams is what distinguishes a good report from a poor one.

2.1 RC Circuit

$$\tan \theta = \left(\frac{1}{\omega RC} \right) = \left(\frac{1}{2\pi f RC} \right) \quad (1)$$

$$I_{max}(t) = V_{max}(t) \frac{C\omega}{\sqrt{(RC\omega)^2 + 1}} \quad (2)$$

Hey, look at equation (1).

$R \text{ (k}\Omega\text{)}$	Calculated		Measured	
	$I \text{ (A)}$	$\theta \text{ (}^\circ\text{)}$	$I \text{ (A)}$	$\theta \text{ (}^\circ\text{)}$
1	-	72.56	-	-
5	-	32.48	-	-
10	-	17.67	-	-

Table 1: Calculated and measured values in the RC circuit ($f = 10 \text{ kHz}$)

2.2 RL Circuit

$$\tan \theta = \left(\frac{-\omega L}{R} \right) = \left(\frac{-2\pi f L}{R} \right) \quad (3)$$

$$I_{max}(t) = \frac{V_{max}(t)}{\sqrt{R^2 + L^2\omega^2}} \quad (4)$$

R (k Ω)	$1\mu H$		$220\mu H$		$470\mu H$		$1000\mu H$	
	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)
1	10.0	-0.18	8.23	-34.65	5.61	-55.89	3.03	-72.34
5	2.00	-0.04	1.98	-7.87	1.92	-16.45	1.69	-32.14
10	1.00	-0.02	0.998	-3.95	0.989	-8.40	0.954	-17.44

Table 2: Calculated values in the RL circuit ($f = 500$ kHz)

R (k Ω)	$1\mu H$		$220\mu H$		$470\mu H$		$1000\mu H$	
	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)	I (mA)	θ ($^\circ$)
1	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-

Table 3: Measured values in the RL circuit ($f = 500$ kHz)

3 Discussion and Conclusion

The discussion and conclusion should answer the questions that are posed in the procedure section of the experiment. Any special observations made by the student can be recorded here.

4 LaTeX Tips

Check the source file for additional information in the comments.

4.1 Symbols

Most math symbols and all equations are bounded by \$ delimiters. `$ A=\pi r^2 $` produces $A = \pi r^2$. To find the appropriate symbol you will have to use a LaTeX IDE with a built in symbol editor or use another program to produce the code and copy-and-paste it into your document.

4.2 Figures

```
\begin{figure}[h]
\centering
\includegraphics[width=0.75\textwidth]{Uvic_logo}
\caption{A logo used by the University of Victoria}
\label{fig:uvic_logo}
\end{figure}
```



Figure 1: A logo used by the University of Victoria

A good tutorial for the use of figures can be found at: http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions

4.3 Tables

```
\begin{table}[h]
\centering
\begin{tabular}{llr}
\hline
\multicolumn{2}{c}{Item} \\
\cline{1-2}
Animal & Description & Price (\$) \\
\hline
Gnat & per gram & 13.65 \\
      & & \\
      & & \\
      & each & 0.01 \\
Gnu & stuffed & 92.50 \\
Emu & stuffed & 33.33 \\
Armadillo & frozen & 8.99 \\
\hline
\end{tabular}
\caption{Exotic meat prices}
\label{table:meats}
\end{table}
```

Item		
Animal	Description	Price (\$)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

Table 4: Exotic meat prices

Apparently tables are more readable if the vertical rulings are omitted. I'm inclined to agree.

A good tutorial for the use of tables can be found at: <http://en.wikibooks.org/wiki/LaTeX/Tables>

4.4 Labels and References

LaTeX's dynamic referencing system gives it an advantage over other multi-user document tools. References point to assigned labels rather than a pre-defined numbering. Changing the order and number of references will leave the citations untouched if label referencing is used.

The `\label{}` tag should be attached to all sections, figures and tables. To reference these elements, use the `\ref{}` command. To reference the table in Section 4.3, you would write `Table \ref{table:meats}` which will appear as Table 4.

A consistent naming schema will make collaboration easier. Labels should be implemented with the corresponding prefix:

Sections	<code>{sec:}</code>
Figures	<code>{fig:}</code>
Tables	<code>{table:}</code>

You may encounter a situation where a citation or page number appears as `??`. This often occurs when major changes have occurred to the reference or page order. The LaTeX compiler requires two executions of the typesetting function to correctly address the references: one to build the `.aux` file and another to read from it. The compiler is often nice enough to pass a warning when the `.aux` file has undergone significant changes to its references and prompts you do another typesetting.

4.5 Resources

- [Video playlist](#) from McMaster that covers the installation and use of LaTeX. Uses TeXShop for examples. Covers document setup, tables, figures, bibliographies and some other stuff I haven't watched yet.