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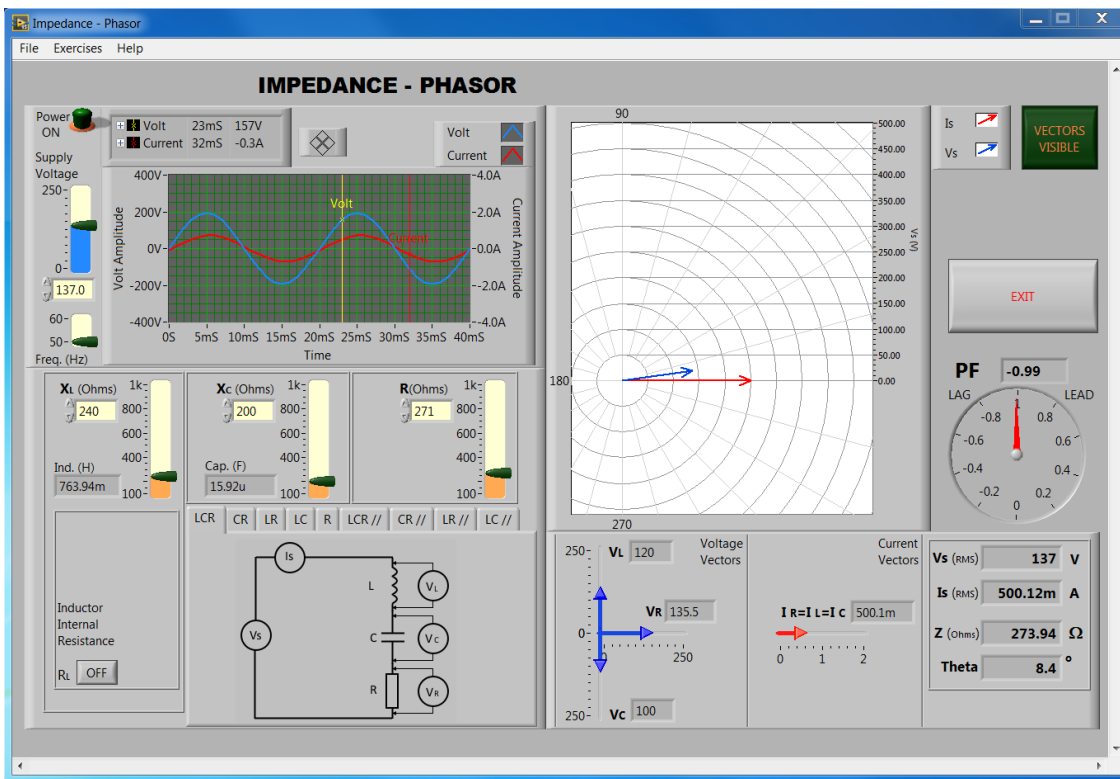
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USER GUIDE

IMPEDANCE – PHASOR



LabVIEW Simulation Software

INTRODUCTION

Impedance – Phasor application is written to help students to do practical exercises using LabVIEW simulation software. This application is for single phase LCR circuits. You will find the intuitive controls and the layout of components very user friendly and easy to use with minimal help. The instructions below will help you to get started.

CONTROLS AND DISPLAYS LAYOUT

The screenshot shows the 'IMPEDANCE - PHASOR' application window. The interface includes a menu bar at the top, a main control area with various sliders and buttons, and several display panels. Callout boxes on the left and right identify the following elements:

- Menu bar:** File, Exercises, Help
- Input power controls:** Power ON/OFF, Voltage (250V), Current (32mA), Frequency (137.0 Hz)
- LCR controls:** Inductor (763.94mH), Capacitor (15.92uF), Resistor (271 Ohms)
- Circuit selection controls:** LCR, CR, LR, LC
- Inductor internal resistance:** R_L OFF
- Vector display:** A polar plot showing voltage and current vectors.
- Phasor diagram:** A rectangular plot showing the relationship between voltage and current vectors.
- Exit / close application:** EXIT button
- Power Factor display:** PF -0.99, LAG/LEAD indicator
- Power supply and load:** Vs (RMS) 137 V, Is (RMS) 500.12m A, Z (Ohms) 273.94 Ω, Theta 8.4°
- Voltage vectors:** V_L 120, V_R 135.5, V_C 100
- Current vectors:** I_R = I_L = I_C 500.12m A

MENU BAR

File

- Print Window. Print a screenshot of the window
- Exit. Close this application

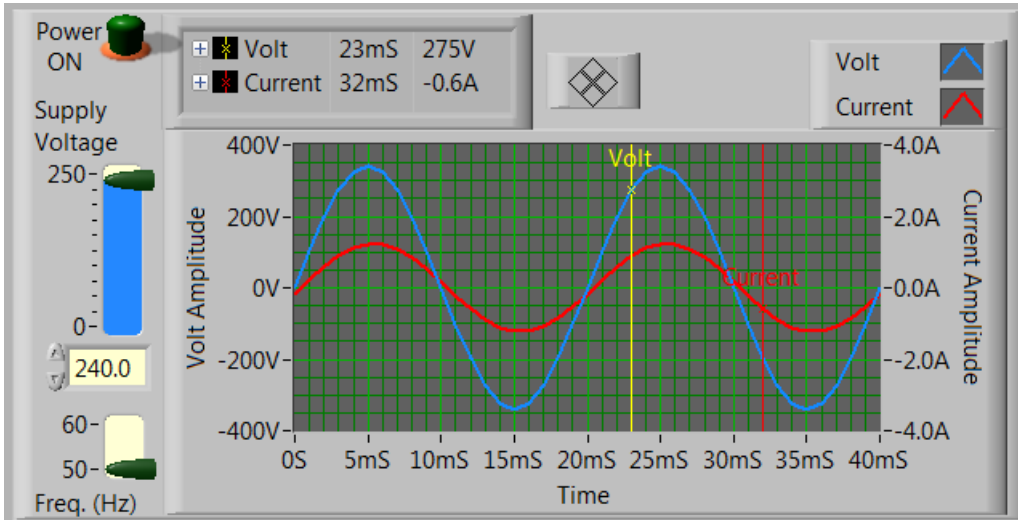
Exercises

- Student Exercises. Opens a student exercises document.
- Reactance XL. Opens a pop-up window to calculate reactance of an inductor value or to calculate the inductance of an inductor with a reactance value.
- Reactance XC. Opens a pop-up window to calculate reactance of a capacitor value or to calculate the capacitance of a capacitor with a reactance value.
- Power Factor. Opens a pop-up window to calculate power factor of a given angle or calculate the angle of a given power factor.
- Calculator. Opens the standard windows calculator

Help

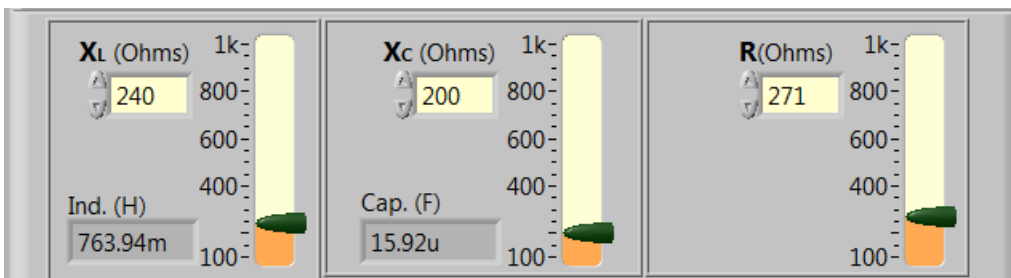
- Help on This VI. Opens a user guide document
- Licence. Opens a pop-up window to show the licence information for this application. Here you can enter the licence key to activate this application.
- About LabVIEW. Opens a pop up window to show the LabVIEW software information.

INPUT POWER CONTROLS



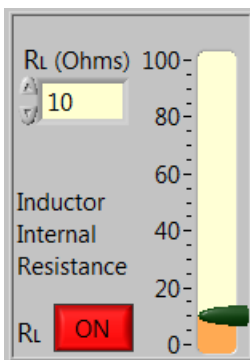
In this section you can set the supply voltage, frequency and turn on/off the power. The graph shows the voltage and current waveforms for the applied load. You can use the cursors to find the instantaneous values of voltage and current waveforms.

LCR CONTROLS



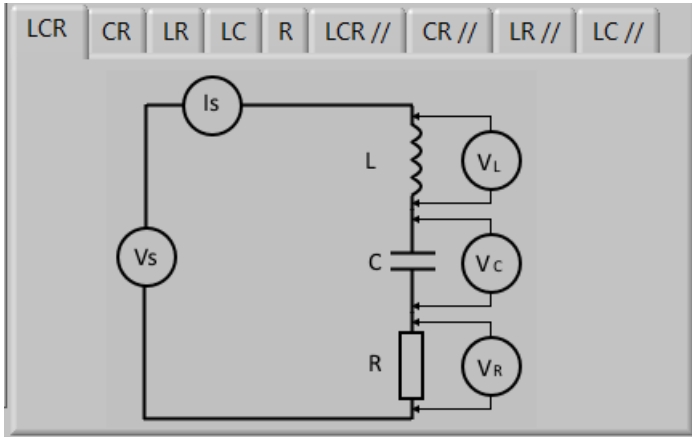
In this section you can adjust the resistor and reactance values in ohms. It displays the corresponding values of inductance and capacitance for the selected reactance.

INDUCTOR INTERNAL RESISTANCE CONTROL



In this section you can turn off the internal resistance of an inductor (ideal case scenario) or turn on and adjust the resistance value of the inductor.

CIRCUIT SELECTION CONTROL



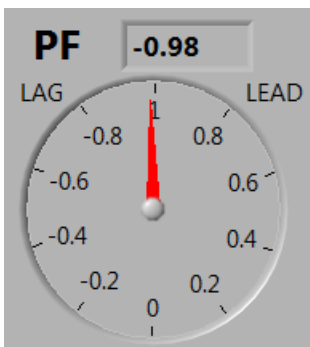
In this section you can select the type of circuit. The first five tabs select the series circuits for LCR, CR, LR, LC and R. the remaining four tabs select the parallel circuits for LCR, CR, LR and LC. When you select one tab, the corresponding circuit is displayed and it shows the meters connected to each component.

VECTOR DISPLAY CONTROL



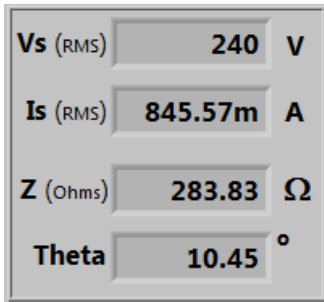
This button allows you to visible / hide all the voltage, current vectors and the phasor diagram. This is useful when you want to work out the vectors by yourself when doing the exercises and later reveal to check your answers.

POWER FACTOR DISPLAY



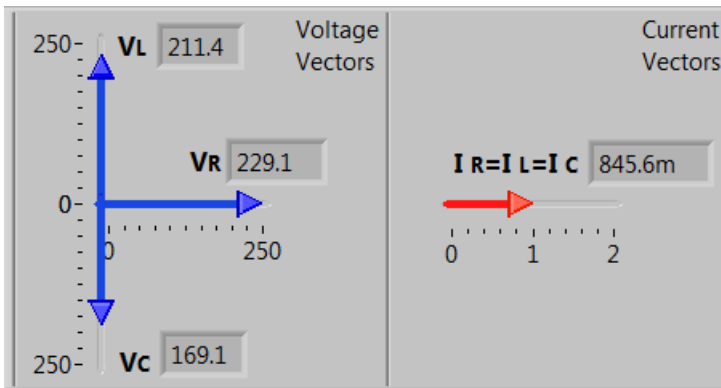
This shows the leading or lagging angle and the power factor of the load.

POWER SUPPLY AND LOAD DISPLAY

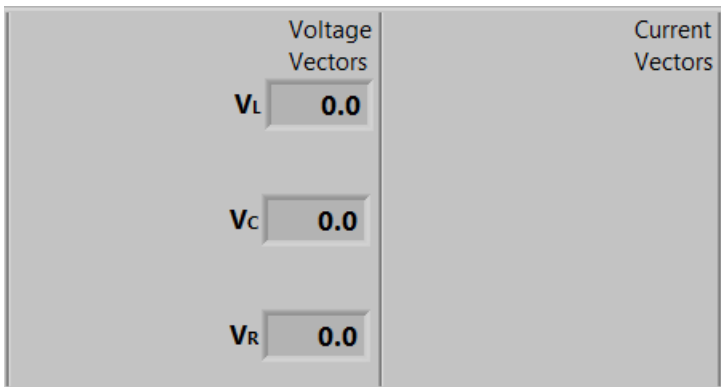


This display shows the supply voltage, supply current, load impedance and phase angle theta.

VOLTAGE AND CURRENT VECTORS DISPLAY



This display shows the voltage and current vectors for the selected circuit when the selection is 'vectors visible'.



This will show only the voltage and current values when the selection is 'vectors hidden'

USING THE SIMULATION APPLICATION

STEPS

1. Select the type of circuit
2. Adjust the values of LCR. Turn on/off the inductor internal resistance and adjust its value.
3. Select the frequency of the power supply
4. Set the power supply voltage to 0v
5. Select 'vectors hidden' to hide all the vectors.
6. Turn on the power supply
7. Adjust the supply voltage and observe the voltage and current waveforms.
8. Record the volt and current meter readings from the voltage and current vector display area.
9. Draw the vectors in your notebook based on the type of circuit and the readings you recorded in step 8.
10. Select 'vectors visible' to show all the vectors and phasor diagram
11. Compare your vector plots with the phasor diagram. If different, then check your plot and explain why you have a different plot.

Enjoy learning phasors!

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