Lab 4 - Results: Phasors and AC Power

*ECE202: Electrical Circuits I – (CircuitJS version)*

|  |  |  |
| --- | --- | --- |
| Name | Student ID | CCID |
|  |  |  |

# 2.1 Individual Components

|  |  |  |  |
| --- | --- | --- | --- |
| **Circuit 1** | | | |
| **V1 = 5VPEAK @ 40Hz** | **R1** *(1kΩ)* | **L1** *(3.98H)* | **C1** *(3.98uF)* |
| **VMAX** *(V)* |  |  |  |
| **VMIN** *(V)* |  |  |  |
| **VRMS** *(V)* |  |  |  |
| **IMAX** *(mA)* |  |  |  |
| **IMIN** *(mA)* |  |  |  |
| **IRMS** *(mA)* |  |  |  |
| **R/XL/XC** *(Ω)* |  |  |  |
| **t1(VMAX)** *(ms)* |  |  |  |
| **t2(VMAX)** *(ms)* |  |  |  |
| **period** *(ms)* |  |  |  |
| **frequency** *(Hz)* |  |  |  |
| **t3(IMAX)***(ms)* |  |  |  |
| **I***(lead/lag)***V** |  |  |  |
| **tphase** *(ms)* |  |  |  |
| **phase** *(°)* |  |  |  |
| **PMAX** *(mW)* |  |  |  |
| **PAVERAGE** *(mW)* |  |  |  |
| **PMIN** *(mW)* |  |  |  |

# 2.2 Series RLC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Circuit 2 – Voltage and Current**  **V1** = 5 *VPEAK*, **C1** = *100 nF*, **L1** = *10 mH*, **R1** = *470 Ω* | | | | |
| **freq** *(Hz)* | **2,500** | **5,000** | **10,000** | **20,000** |
| **V1MAX** *(V)* |  |  |  |  |
| **t1(V1MAX)** *(us)* |  |  |  |  |
| **t2(V1MAX)** *(us)* |  |  |  |  |
| **period** *(us)* |  |  |  |  |
| **freq** *(kHz)* |  |  |  |  |
| **I1MAX** *(mA)* |  |  |  |  |
| **t(I1MAX)** *(us)* |  |  |  |  |
| **I1** *(lead/lag)* **V1** |  |  |  |  |
| **I1 phase***(°)* |  |  |  |  |
| **VCMAX** *(V)* |  |  |  |  |
| **t(VCMAX)** *(us)* |  |  |  |  |
| **VC** *(lead/lag)* **V1** |  |  |  |  |
| **VC phase** *(°)* |  |  |  |  |
| **VLMAX** *(V)* |  |  |  |  |
| **t(VLMAX)** *(us)* |  |  |  |  |
| **VL** *(lead/lag)* **V1** |  |  |  |  |
| **VL phase** *(°)* |  |  |  |  |
| **VRMAX** *(V)* |  |  |  |  |
| **t(VRMAX)** *(us)* |  |  |  |  |
| **VR** *(lead/lag)* **V1** |  |  |  |  |
| **VR phase** *(°)* |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **Circuit 2 – Power** 2. **V1** = 5 *VPEAK*, **C1** = *100 nF*, **L1** = *10 mH*, **R1** = *470 Ω* | | | | |
| 1. **freq** *(Hz)* | 1. **2,500** | 1. **5,000** | 1. **10,000** | 1. **20,000** |
| 1. **PV1AVERAGE** *(mW)* |  |  |  |  |
| 1. **PCAVERAGE** *(mW)* |  |  |  |  |
| 1. **PLAVERAGE** *(mW)* |  |  |  |  |
| 1. **PRAVERAGE** *(mW)* |  |  |  |  |
| 1. **PV1**  *(mW)* |  |  |  |  |
| 1. **QV1** *(mVAR)* |  |  |  |  |
| 1. **SV1** *(mVA)* |  |  |  |  |
| 1. **PF** *(-)* |  |  |  |  |

# 2.3 Parallel RC

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **Circuit 3 – Voltage and Current** 2. **V1** = 5 *VPEAK*, **C1** = *220 nF*, **R1** = *2.2 kΩ* | | | |
| 1. **freq** *(Hz)* | 1. **250** | 1. **500** | 1. **1000** |
| **V1MAX** *(V)* |  |  |  |
| **t1(V1MAX)** *(ms)* |  |  |  |
| **t2(V1MAX)** *(ms)* |  |  |  |
| **period** *(ms)* |  |  |  |
| **freq** *(Hz)* |  |  |  |
| **I1MAX** *(mA)* |  |  |  |
| **t(I1MAX)** *(ms)* |  |  |  |
| **I1** *(lead/lag)* **V1** |  |  |  |
| **I1 phase***(°)* |  |  |  |
| **ICMAX** *(mA)* |  |  |  |
| **t(ICMAX)** *(ms)* |  |  |  |
| **IC** *(lead/lag)* **V1** |  |  |  |
| **IC phase *(°)*** |  |  |  |
| **IRMAX** *(mA)* |  |  |  |
| **t(IRMAX)** *(ms)* |  |  |  |
| **IR** *(lead/lag)* **V1** |  |  |  |
| **IR phase *(°)*** |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **Circuit 3 – Power** 2. **V1** = 5 *VPEAK*, **C1** = 220 *nF*, **R1** = *2.2 kΩ* | | | |
| 1. **freq** *(Hz)* | 1. **250** | 1. **500** | 1. **1000** |
| 1. **P1AVERAGE** *(mW)* |  |  |  |
| 1. **PCAVERAGE** *(mW)* |  |  |  |
| 1. **PRAVERAGE** *(mW)* |  |  |  |
| 1. **PV1**  *(mW)* |  |  |  |
| 1. **QV1** *(mVAR)* |  |  |  |
| 1. **SV1** *(mVA)* |  |  |  |
| 1. ***PF*** *(-)* |  |  |  |

# Plots

The following pages have been left for you to include the plots that you are required to create as part of your post-lab.

To create your plots you can use whichever software you would like (Paint, Excel, Matlab, etc) or simply draw them by hand if you like, but make sure it is tidy (you will need to scan and include it as an image in your report).

# Individual Components - Phasor Diagram

< Insert your 3 phasor diagrams for R, L and C here >

Delete all the light grey text and insert your plot.

Create a phasor diagram for the voltage and current for each individual component that you measured in section 2.1 (3 total). Don’t worry about the scales of the phasors just make sure to label the voltage, current and angle with their name and magnitudes. Make sure to title each phasor.

# Series RLC Circuit - Phasor Diagram

< Insert your 4 phasor diagrams, 1 for each frequency here >

Delete all the light grey text and insert your plot.

Create a phasor diagram for the series RLC circuit that you measured in section 2.2. Include the following signals: VS, IS, VL, VC and VR. Use VS as you reference signal (0°). You need to make 1 phasor diagram for each frequency (4 total).

# Series RLC Circuit - Power Triangle

< Insert your 4 power triangle plots, 1 for each frequency here >

Delete all the light grey text and insert your plot.

Create a power triangle plot for the series RLC circuit that you measured in section 2.2. Include the following signals: P, Q and S. You need to make 1 power triangle plot for each frequency (4 total).

# Parallel RC Circuit - Phasor Diagram

< Insert your 3 phasor diagrams, one for each frequency here >

Delete all the light grey text and insert your plot.

Create a phasor diagram for the parallel RC circuit that you measured in section 2.3. Include the following signals: VS, IS, IR, and IC. Use VS as you reference signal (0°). You need to make 1 phasor diagram for each frequency (3 total).

# Parallel RC Circuit - Power Triangle

< Insert your 3 power triangle plots, one for each frequency here >

Delete all the light grey text and insert your plot.

Create a power triangle plot for the parallel RC circuit that you measured in section 2.3. Include the following signals: P, Q and S. You need to make 1 power triangle plot for each frequency (3 total).