**Experiment 26**: AC Steady State

(Edit this document as needed)

Partner 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Partner 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Part A*

Period of the reference signal

|  |
| --- |
| [s] |

Signal frequency

|  |
| --- |
| [Hz] |

Signal radial frequency

|  |
| --- |
| [rad/s] |

Amplitude of the reference signal

|  |
| --- |
|  |

Sinusoidal form of the reference signal

Phasor form of the reference signal

Amplitude of the other signal

|  |
| --- |
|  |

Phase difference between signals

|  |
| --- |
| [rad] |
| [degrees] |

Sinusoidal form of the other signal

Phasor form of the other signal

*Part B RC and RL circuits*

Alice desktop plots of the source voltage and capacitor voltage at 1kHz

Amplitude of the capacitor voltage

|  |
| --- |
| [V] |

Phase difference of the capacitor voltage (either radians or degrees)

|  |
| --- |
|  |

Sinusoidal form of the capacitor voltage

Phasor form of the capacitor voltage

Alice desktop plots of the source voltage and resistor voltage at 1kHz

Amplitude of the resistor voltage

|  |
| --- |
| [V] |

Phase difference of the resistor voltage in degrees

|  |
| --- |
|  |

Sinusoidal form of the resistor voltage

Phasor form of the resistor voltage

Alice desktop, amplitude, phase and phasor form of the capacitor voltage at various frequencies

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency [Hz] | Amplitude [V] | Phase [degrees] | Phasor form |
| 10 |  |  |  |
| 100 |  |  |  |
| 500 |  |  |  |
| 1kHz |  |  |  |
| 2kHz |  |  |  |
| 10kHz |  |  |  |
| 20kHz |  |  |  |

Matlab plot of voltage vs log(f)

What trends do you notice in the plot?

Matlab plot of phase vs log(f)

What trends do you notice in the plot?

LTspice, amplitude, phase and phasor form of the capacitor voltage at various frequencies

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency [Hz] | Amplitude [V] | Phase [degrees] | Phasor form |
| 10 |  |  |  |
| 100 |  |  |  |
| 500 |  |  |  |
| 1kHz |  |  |  |
| 2kHz |  |  |  |
| 10kHz |  |  |  |
| 20kHz |  |  |  |

Matlab plot of voltage vs log(f)

Matlab plot of phase vs log(f)

How do the simulation and experimental results compare?

Alice desktop plots of the source voltage and inductor voltage at 1kHz

Amplitude of the inductor voltage

|  |
| --- |
| [V] |

Phase difference of the inductor voltage (either radians or degrees)

|  |
| --- |
|  |

Sinusoidal form of the inductor voltage

Phasor form of the inductor voltage

Alice desktop plots of the source voltage and resistor voltage at 1kHz

Amplitude of the resistor voltage

|  |
| --- |
| [V] |

Phase difference of the resistor voltage in degrees

|  |
| --- |
|  |

Sinusoidal form of the resistor voltage

Phasor form of the resistor voltage

Alice desktop, amplitude, phase and phasor form of the inductor voltage at various frequencies

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency [Hz] | Amplitude [V] | Phase [degrees] | Phasor form |
| 10 |  |  |  |
| 100 |  |  |  |
| 500 |  |  |  |
| 1kHz |  |  |  |
| 2kHz |  |  |  |
| 10kHz |  |  |  |
| 20kHz |  |  |  |

Matlab plot of voltage vs log(f)

What trends do you notice in the plot?

Matlab plot of phase vs log(f)

What trends do you notice in the plot?

LTspice, amplitude, phase and phasor form of the inductor voltage at various frequencies

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency [Hz] | Amplitude [V] | Phase [degrees] | Phasor form |
| 10 |  |  |  |
| 100 |  |  |  |
| 500 |  |  |  |
| 1kHz |  |  |  |
| 2kHz |  |  |  |
| 10kHz |  |  |  |
| 20kHz |  |  |  |

Matlab plot of voltage vs log(f)

Matlab plot of phase vs log(f)

How do the simulation and experimental results compare? What explains the differences?

Due: April 25th, 2022 at 11:59 pm eastern on Gradescope

One student submits on Gradescope and adds their partner using “add group members” option on Gradescope.