ELEC 344 - 201: Applied Electronics and Electromechanics

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Tutorial 2

1) In the circuit shown in Fig. 1, the input voltage is given by: $\boldsymbol{v_{in} = 110V \sin(\omega t)}$, assuming that the frequency is 60 Hz.
    a) Find the input current $\boldsymbol{i_{in}}$ (amplitude and phase)
    b) Find the time delay and the phase shift of the current vs. voltage waveform.
    c) Calculate the power factor. Is this a good power factor? How can we improve it?

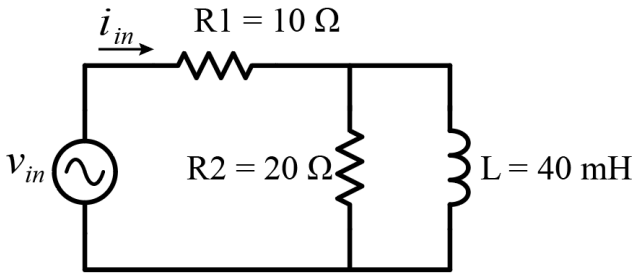

Figure 1 – AC circuit

2) A $\boldsymbol{100\mu F}$ capacitor is added in parallel with the resistor and inductor:
    a) Calculate the new current amplitude and phase.
    b) Find the time delay and the phase shift of the current vs.. voltage waveform.
    c) Calculate the power factor and compare it with the one obtained in 1)

3) Y-Connected 3-phase load. Prove that for the case of a balanced 3-phase source and a balanced 3-phase load, the load center point $\boldsymbol{V_N = 0}$.
   HINT: use the superposition theorem.

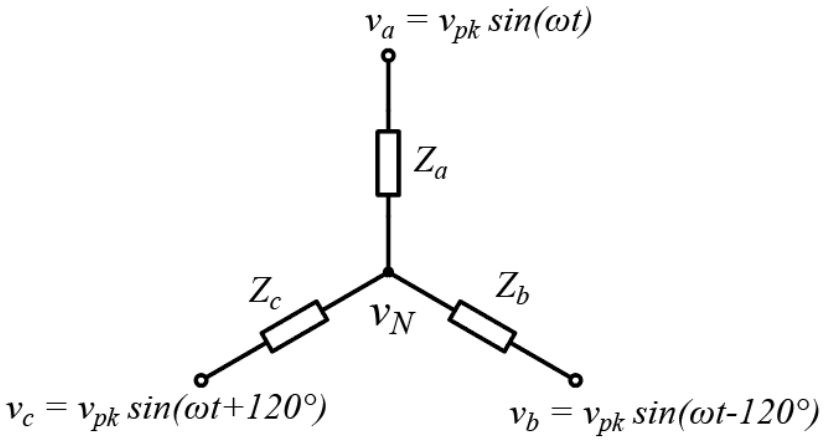

Figure 2 – 3-Phase AC Circuit

4) Derive the RMS of a periodic, symmetrical square and triangular wave, respectively (given that the amplitude is $\boldsymbol{V_{pk}}$.)