Lecture 22, Friday, Feburary 25, 2022

- Available power

  – In an RLC circuit with Thevenin voltage V_T and Thevenin impedance Z_T, the available power is

  $$P_a = \frac{|V_T|^2}{8R_T}$$

  Important: take the magnitude before squaring, and $R_T = \text{Re}\{Z_T\}$ only.

  – This maximum power is achievable only if the load impedance is the matched load:

  $$Z_L = Z_T^* = R_T - jX_T$$

- *Resonance:* possible existence of steady-state co-sinusoidal oscillations wihtout sources..

  – RLC in series
    * Has resonant frequency $\omega_0 = \frac{1}{\sqrt{LC}}$
    * At ω_0,
      · $Z_L = -Z_c \quad \rightarrow \quad Z_L + Z_c = 0$

      series combination of L and C is like a short circuit

      $\rightarrow \quad V_c + V_L = 0 \quad \rightarrow \quad V_c = -V_L \neq 0$

      $\rightarrow \quad V_R = V_i$

      · Get maximum current in circuit: $I = \frac{V_i}{R}$

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