Project Report for ECE 351

PreLab 10 - Frequency Response

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ECE351 Code Repository:
$https://github.com/ElfinPeach/ECE351_Code.git$

ECE351 Report Repository:
$https://github.com/ElfinPeach/ECE351_Report.git$

Contents

1 Objective

Find $|H(j\omega)|$ and $\angle H(j\omega)$ of the following function by hand:

$$H(s) = \frac{\frac{s}{RC}}{s^2+\frac{s}{RC}+\frac{1}{LC}}$$

1.1 Find $H(j\omega)$

$$H(jw) = \frac{\frac{j\omega}{RC}}{(j\omega)^2+\frac{j\omega}{RC}+\frac{1}{LC}}$$
$$H(jw) = \frac{\frac{j\omega}{RC}}{\frac{j\omega}{RC}+\frac{1}{LC}-\omega^2}$$

1.2 Hand Calculations for $|H(j\omega)|$

$$|H(j\omega)| = \frac{\sqrt{(\frac{\omega}{RC})^2}}{\sqrt{(\frac{\omega}{RC})^2+(\frac{1}{LC}-\omega^2)^2}}$$
$$|H(j\omega)| = \frac{\frac{\omega}{RC}}{\sqrt{(\frac{\omega}{RC})^2+(\frac{1}{LC}-\omega^2)^2}}$$

1.3 Hand Calculations for $\angle H(j\omega)$

$$\angle H(j\omega) = \angle(numerator) - \angle(denominator)$$
$$\angle H(j\omega) = tan^{-1}(\frac{\omega}{RC}) - tan^{-1}(\frac{\frac{\omega}{RC}}{\frac{1}{LC}-\omega^2})$$