EE142 Problem Set 5

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October 4, 2017

Problem 1

Find y for the following normalized impedance on Smith Chart.

The straightforward procedure is to plot z_L on the impedance Smith Chart, and then look at what constant admittance and constant suspectance curves cross over the point in the admittance smith chart.

But, we can also plot z_L on the impedance smith chart, then rotate the point by π degrees along the constant SWR circle, and then read off the admittance by looking at the constant resistance and reactance curves.

I'm going to use the second technique; annotated charts aren't included in this document, but I'll compare the chart result I get to the exact calculation.

(a) $z_L = 1.4 + 2j$

$$y_L = \frac{1}{z_L} = \frac{1}{\alpha + \beta j} = \frac{\alpha - \beta j}{\alpha^2 + \beta^2} = 0.234899 - 0.33557j$$
$$y_{L,chart} = 0.22 - 0.32j$$

(b) $z_L = 0.5 + 0.9j$

$$y_L = 0.471698 - 0.849j$$
$$y_{L,chart} = 0.45 - 0.85j$$

(c) $z_L = 1.6 - 0.3j$