Home Assigment Week 1

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1 Task 1

The results presented in this report was calculated using a Python-script I wrote and plotted on a simplified Smith chart, which I also made. I also solved this task by hand using a printed Smith chart to verify the result.

1.1 a

The antenna impedance (normalized with $50\,\Omega$) can be seen in Figure 1. The antenna impedance for the frequency range 900 MHz to 3.6 GHz can be seen in Figure 2.

1.2 b

The return loss and VSWR can be seen in Figure 3.

1.3 c

The antenna impedance can be seen in Figure 1. The black dashed lines are normalized with $70\,\Omega$ and represents intermediate impedances while the solid line is normalized with $50\,\Omega$ and represents the antenna impedance normalized with the system impedance. The dotted lines represent how the end points of the impedance (i.e. the points where $f = 900\,\text{MHz}$ and $f = 3.6\,\text{GHz}$) moves in the smith chart. The antenna impedance for this frequency range can be seen in Figure 5. The return loss and the VSWR can be seen in Figure 6.

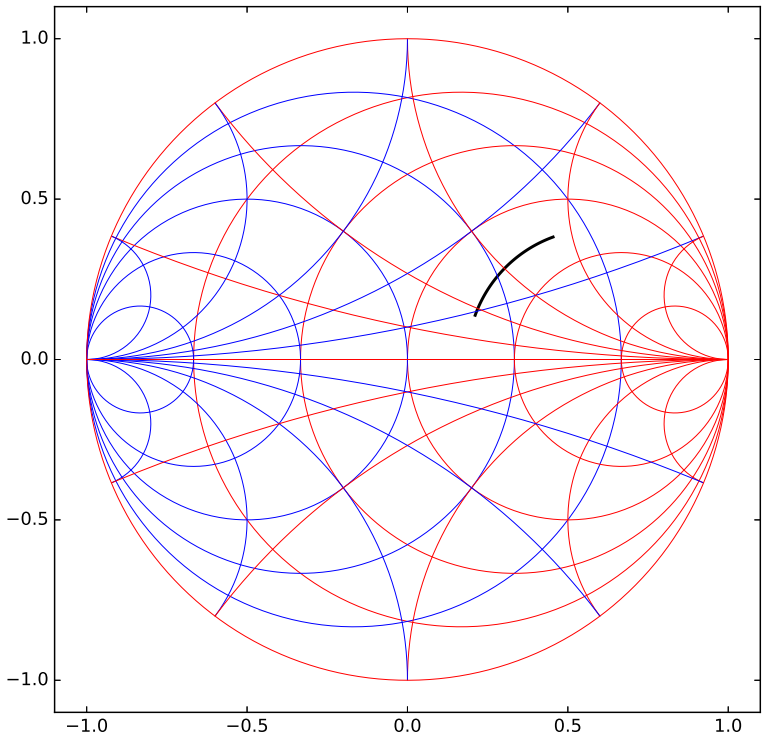

Figure 1: The figure shows the imput impedance of the antenna from Section 1.1 normalized by 50 Ω in the frequency range 900 MHz to 3.6 GHz in a Smith chart.

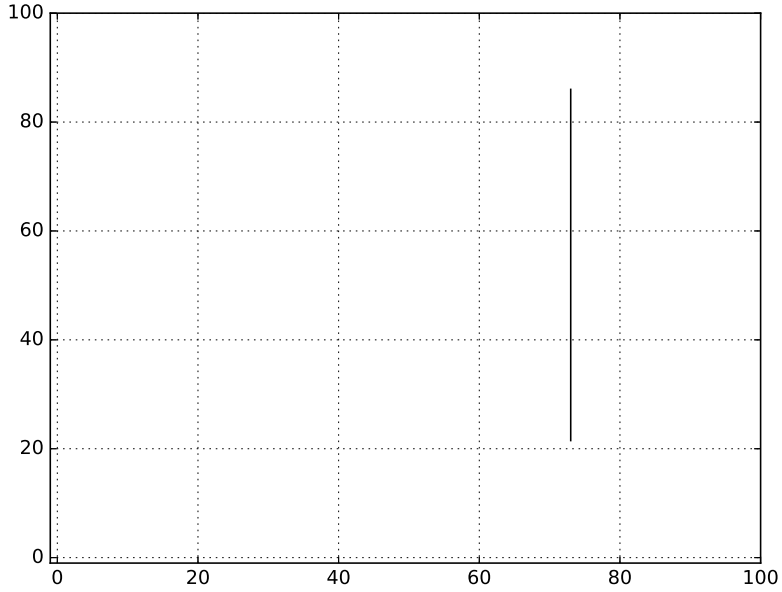

Figure 2: The figure shows the imput impedance of the antenna from Section 1.1 in the frequency range 900 MHz to 3.6 GHz. The horizontal axis shows the real part of the antenna impedance ($\Re\{Z_{\text{antenna}}\}$) and the vertical axis shows the imaginary part of the antenna impedance ($\Im\{Z_{\text{antenna}}\}$).

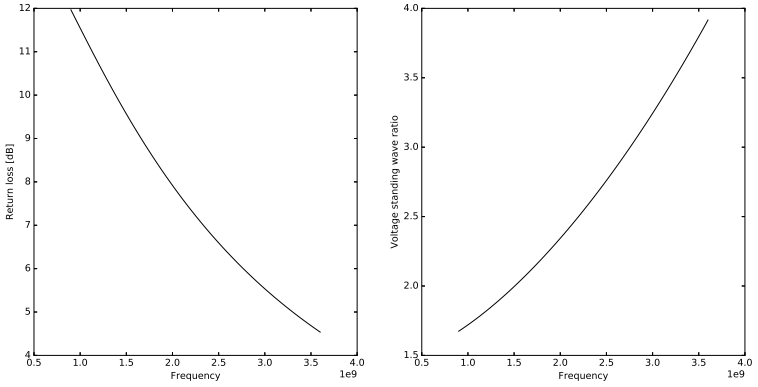

Figure 3: The figure shows the return loss (left) and the standing wave ratio (right) for the antenna from Section 1.2 in the frequency range 900 MHz to 3.6 GHz.

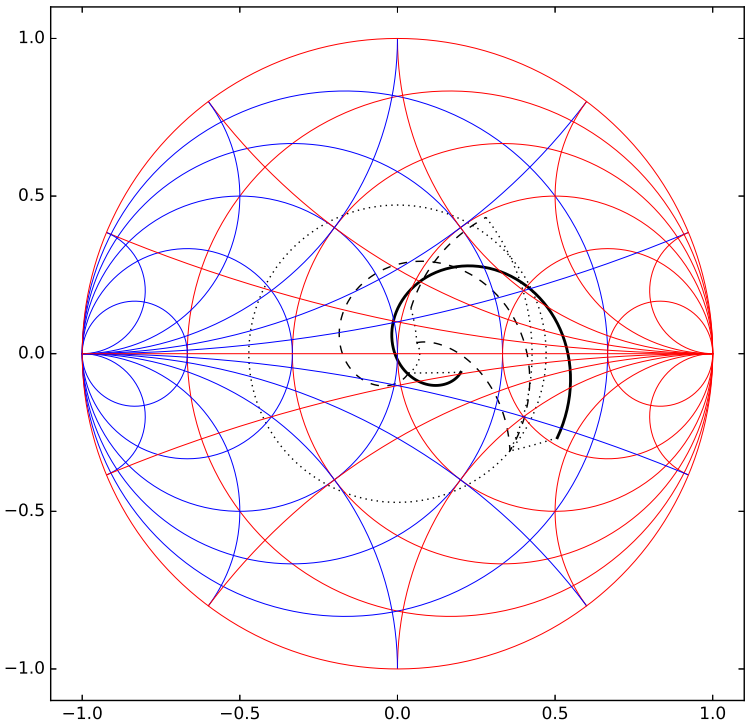

Figure 4: The figure shows the imput impedance of the antenna from Section 1.3 in the frequency range 900 MHz to 3.6 GHz in a Smith chart. The dashed lines are normalized with 70 Ω and represents intermediate impedanses while the solid line is normalized by 50 Ω and represents the antenna impedance. The dashed lines represents how the end points of the impedance moves in the smith chart.

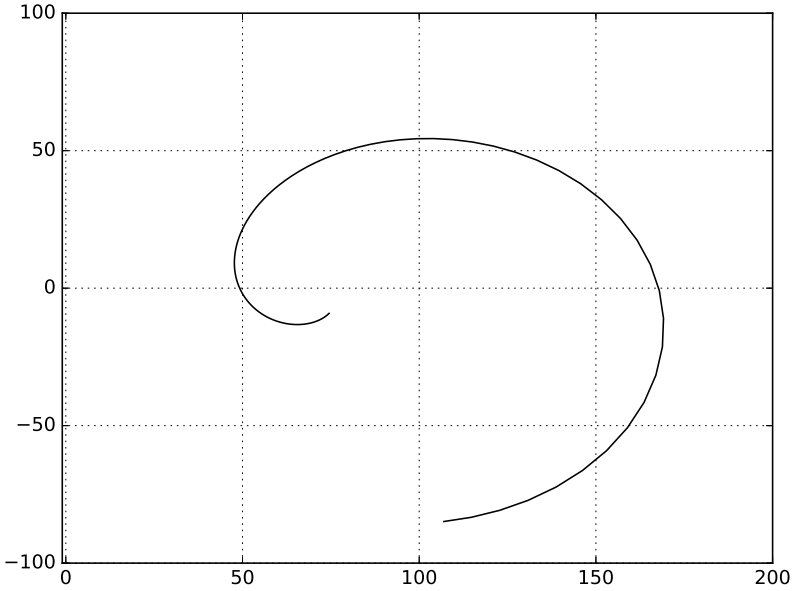

Figure 5: The figure shows the imput impedance of the antenna from Section 1.3 in the frequency range 900 MHz to 3.6 GHz. The horizontal axis shows the real part of the antenna impedance ($\Re\{Z_{\text{antenna}}\}$) and the vertical axis shows the imaginary part of the antenna impedance ($\Im\{Z_{\text{antenna}}\}$).

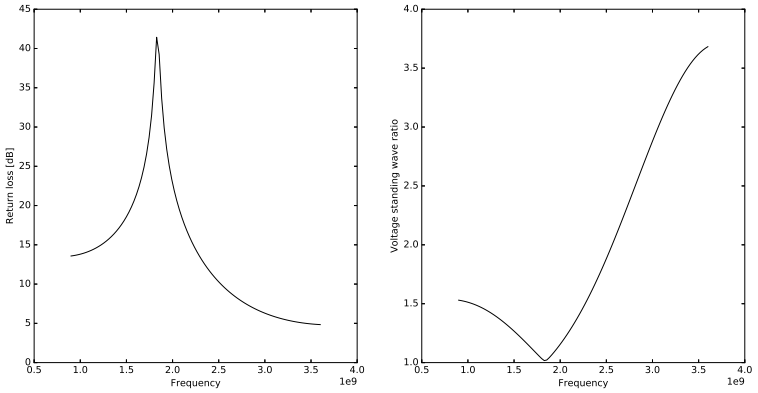

Figure 6: The figure shows the return loss (left) and the standing wave ratio (right) for the antenna from Section 1.3 in the frequency range 900 MHz to 3.6 GHz.