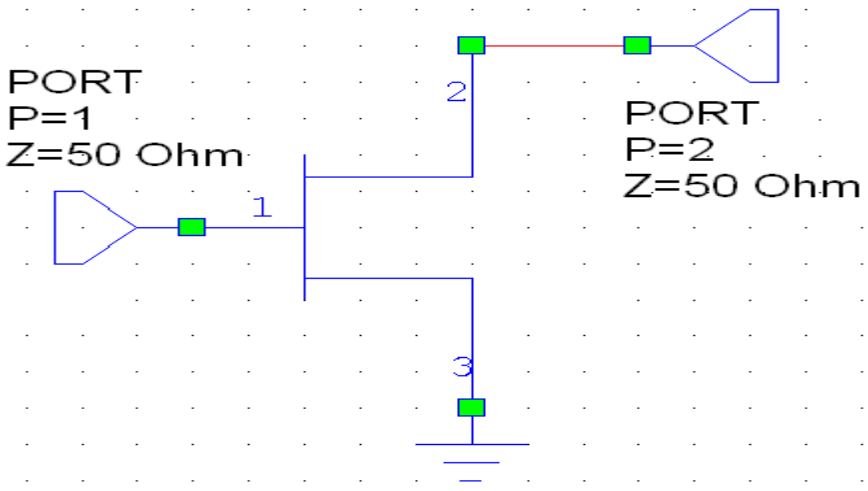
Hello,

I have questions on smith chart. Normally, Smith charts are normally used for transmission line problems and matching circuits. What I understand is, e.g. normally there is a load $Z_L = 0.91 + j\ 0.78\ \Omega$ and let $Z_0 = 50\ \Omega$. Not to match, we calculate $Z_{norm} = Z_L / Z_0$ and then calculate other parameters like τ, VSWR, RL, IL and so on. My question is how do we calculate S-Parameters on a smith chart. The S-Parameters like S_{11}, S_{12}, S_{21}, S_{22} on a smith chart. As we can only plot impedance and admittance on a smith chart? Say for e.g.: for the problem, I get RL=-8.39dB.

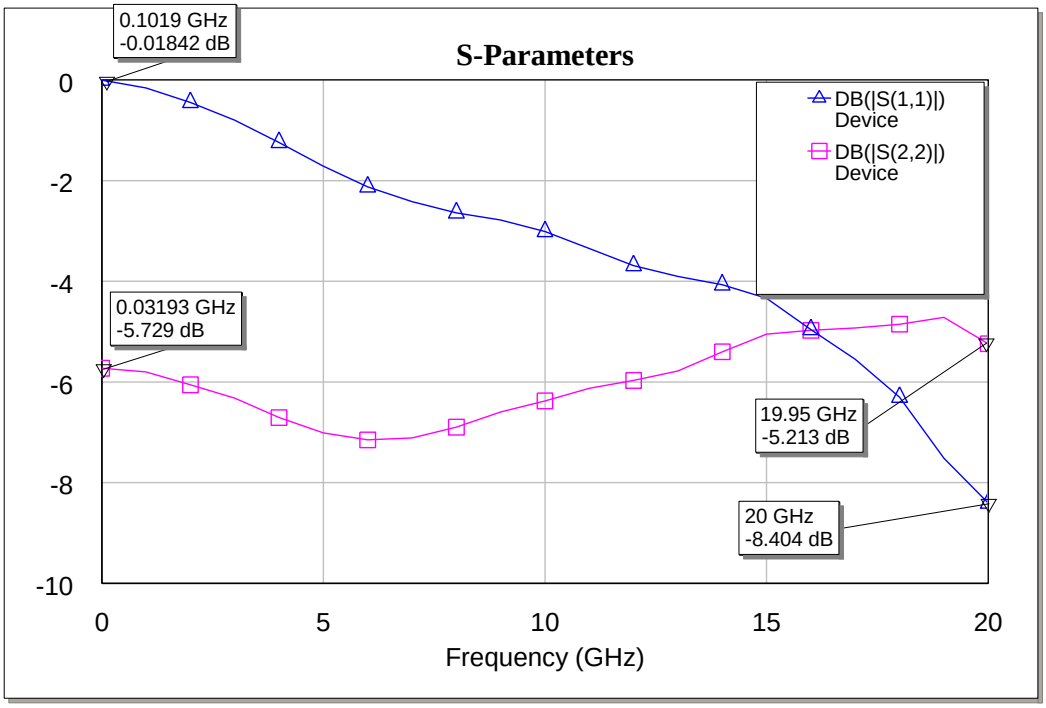
Second question, is an extension to this. In almost all modern CAD Packages, e.g. 1-10GHz in steps of 1GHz, we plot S-Parameters, i.e. S_{11} v/s Freq., S_{12} v/s Freq., S_{21} v/s Freq., S_{22} v/s Freq., We plot them normally on rectangular graphs and we have an option to convert these graphs to smith chart. That means we would be plotting all the S-parameters on smith chart at specific frequencies.

In this context, I have designed a simple circuit (AWR Microwave office) like this

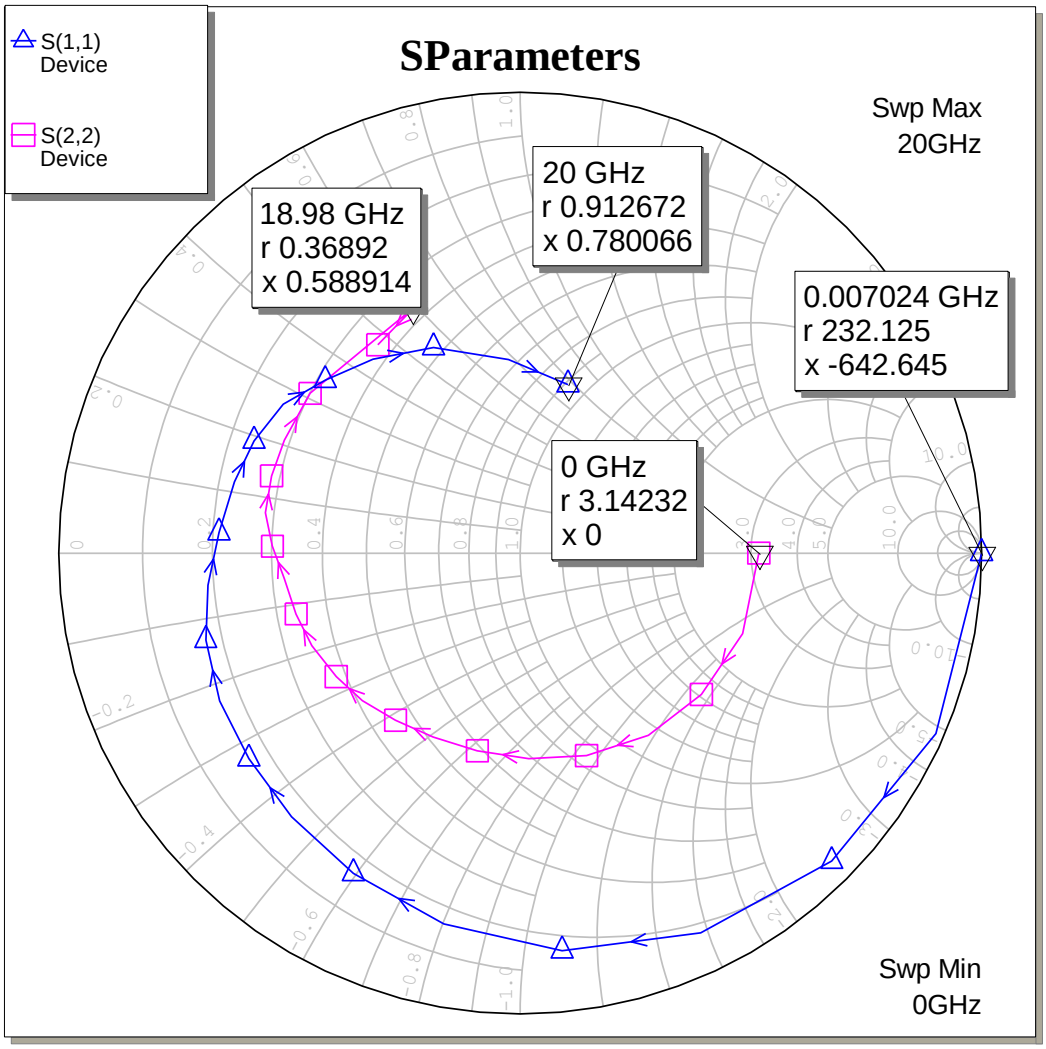


For this circuit, I have imported the data file and put it as a sub circuit and replaced the symbol by a FET Symbol.

For this particular circuit, I have taken start frequency as 0GHz and Stop Frequency as 20GHz and step frequency as 0.1GHz. I have simulated S11, S21 on rectangular and smith chart. The results are shown below. This is the rectangular plot.



Now, the smith chart results are shown.



I want to know, how to plot s-parameters for different frequencies, sometimes I am unable to make any meaning of s-parameters plotted on smith charts. I presume that the software converts the s-parameters to r ± jx format and plots them on resistance and reactance circles. But I want to know how that relates to frequency as the ones mentioned above i.e. Z_L = 0.91 + j 0.78 Ω corresponds to 20GHz. How is it determined as to which parameters correspond to which frequency? I also want to know as to how the selection is made for Z_L = 0.91 + j 0.78 Ω for -8.39dB. kindly clarify.

Cheers,

Avs