



Familiarization with ADS

Lab Exercises on December, 2021

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1 Objective

To provide an overview of the ADS software, and deliver stepwise guidance to familiarize the student about the basic features of ADS.

Note: Refer lab sheet for background theory.

2 Lab Exercises

Problem 1

Schematic, simulation and visualization of example circuit

S-Parameter Simulation

Linear Frequency Sweep

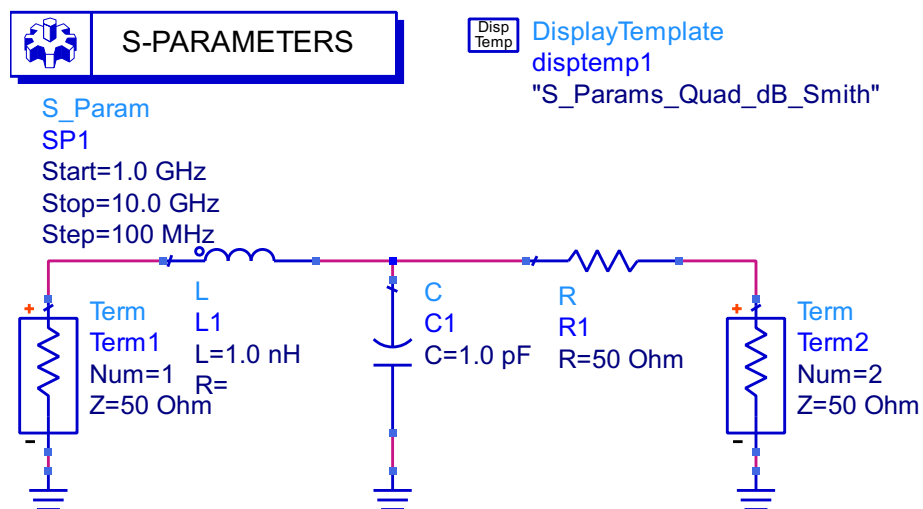


Figure 1: RLC circuit for S-parameter simulation

Simulation plots

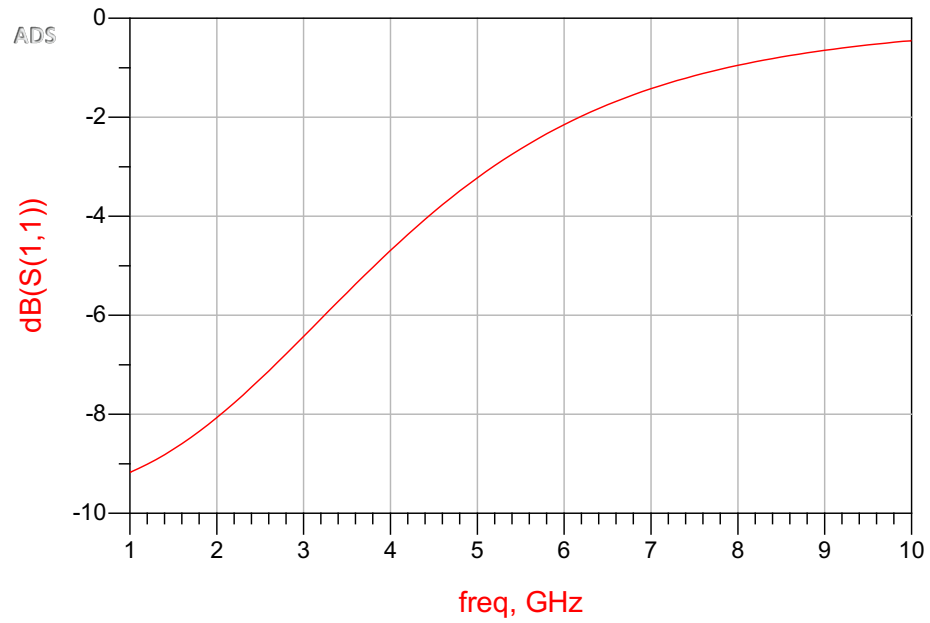


Figure 2: Magnitude (dB) of S_{11} vs Frequency

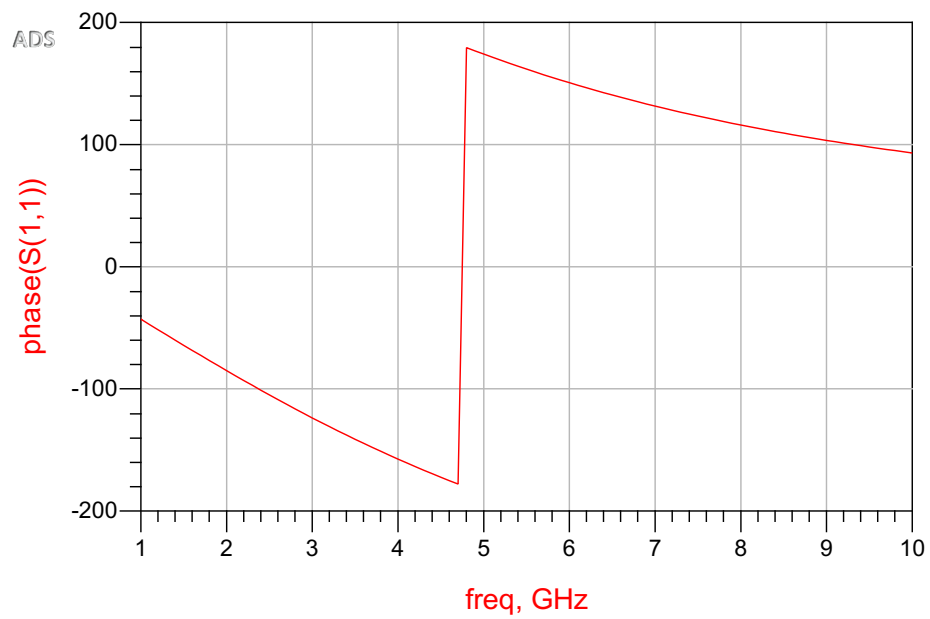


Figure 3: Phase (deg) of S_{11} vs Frequency

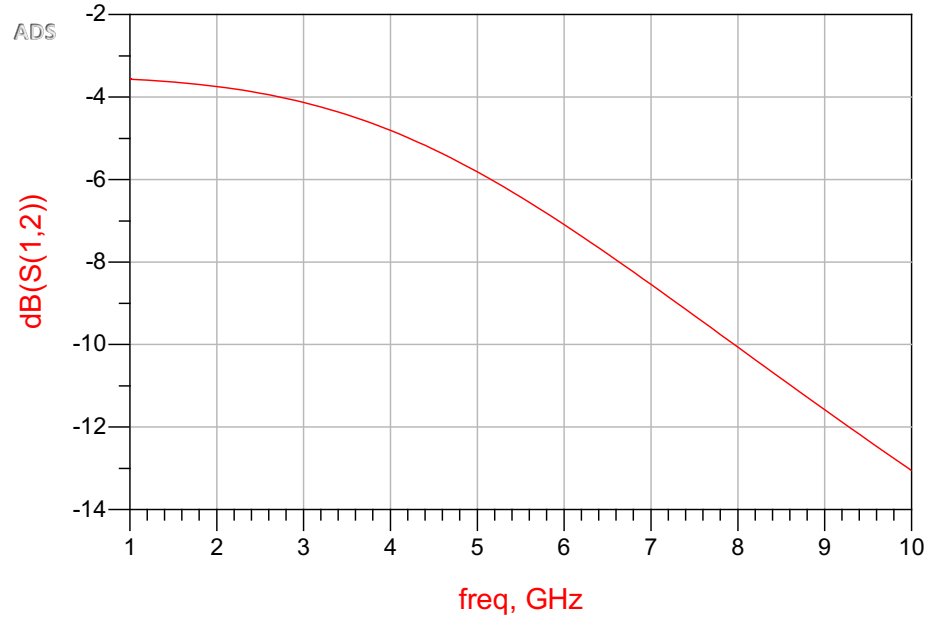


Figure 4: Magnitude (dB) of S₁₂ vs Frequency

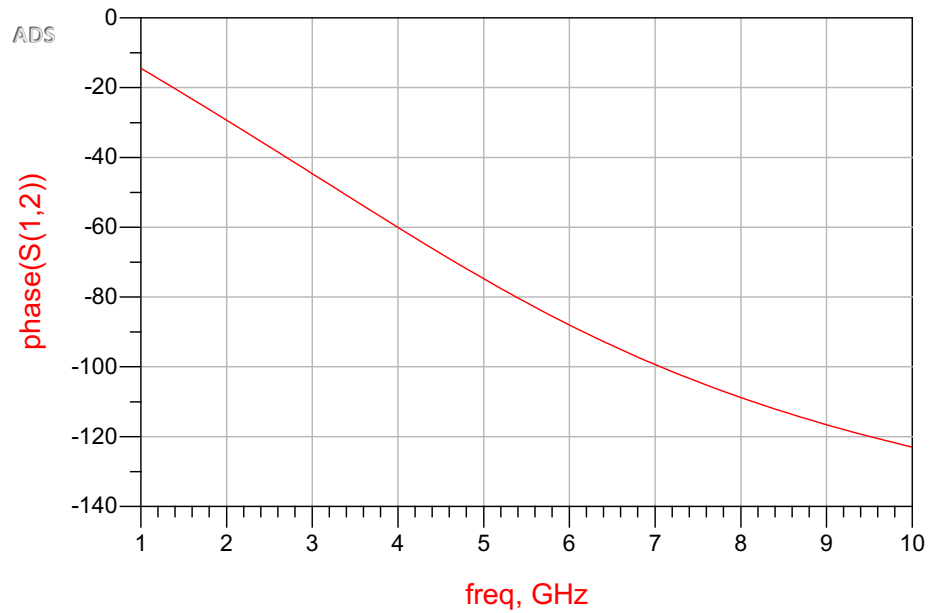


Figure 5: Phase (deg) of S₁₂ vs Frequency

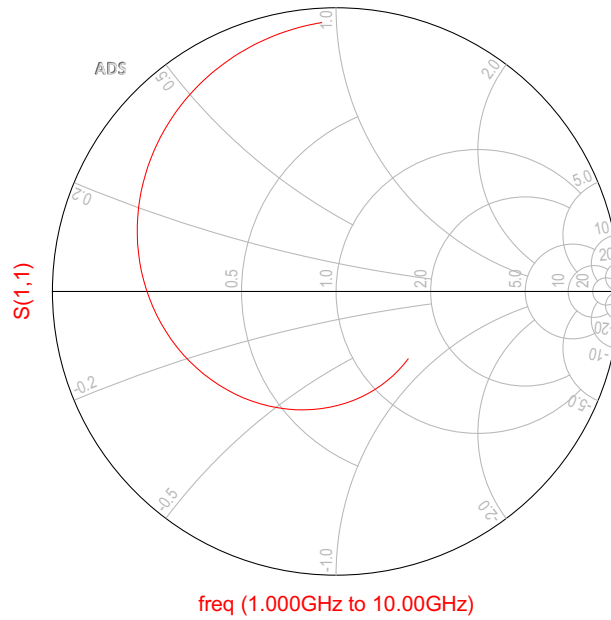


Figure 6: Smith chart of S_{11} vs Frequency

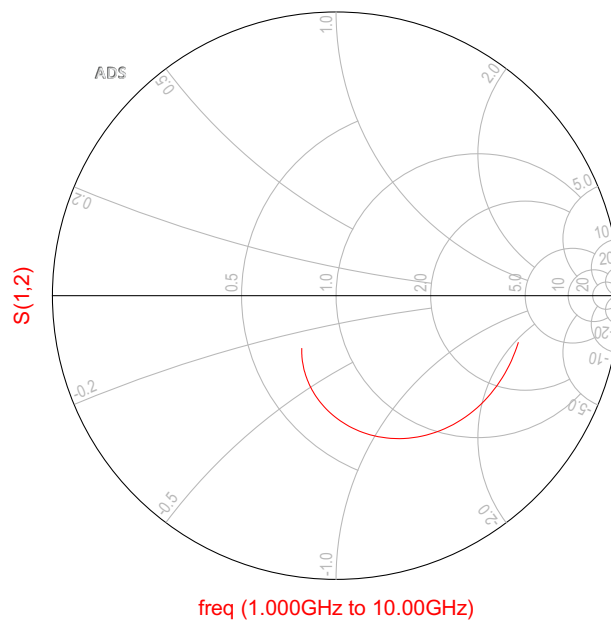


Figure 7: Smith chart of S_{12} vs Frequency

Familiarization with ADS

freq	var("S")			
	(1,1)	(1,2)	(2,1)	(2,2)
1.000 GHz	0.348 / -43.097	0.663 / -14.473	0.663 / -14.473	0.334 / -7.311
1.100 GHz	0.351 / -47.375	0.662 / -15.937	0.662 / -15.937	0.334 / -8.067
1.200 GHz	0.354 / -51.643	0.661 / -17.405	0.661 / -17.405	0.334 / -8.829
1.300 GHz	0.358 / -55.896	0.660 / -18.877	0.660 / -18.877	0.334 / -9.599
1.400 GHz	0.362 / -60.134	0.659 / -20.355	0.659 / -20.355	0.335 / -10.377
1.500 GHz	0.367 / -64.354	0.658 / -21.837	0.658 / -21.837	0.335 / -11.162
1.600 GHz	0.372 / -68.553	0.656 / -23.324	0.656 / -23.324	0.335 / -11.956
1.700 GHz	0.377 / -72.728	0.655 / -24.817	0.655 / -24.817	0.335 / -12.758
1.800 GHz	0.383 / -76.878	0.653 / -26.315	0.653 / -26.315	0.335 / -13.570
1.900 GHz	0.389 / -80.999	0.652 / -27.819	0.652 / -27.819	0.335 / -14.390
2.000 GHz	0.395 / -85.090	0.650 / -29.327	0.650 / -29.327	0.335 / -15.219
2.100 GHz	0.402 / -89.146	0.648 / -30.841	0.648 / -30.841	0.335 / -16.058
2.200 GHz	0.409 / -93.167	0.645 / -32.360	0.645 / -32.360	0.335 / -16.906
2.300 GHz	0.416 / -97.149	0.643 / -33.883	0.643 / -33.883	0.335 / -17.763
2.400 GHz	0.424 / -101.091	0.640 / -35.412	0.640 / -35.412	0.334 / -18.629
2.500 GHz	0.432 / -104.991	0.638 / -36.944	0.638 / -36.944	0.334 / -19.503
2.600 GHz	0.440 / -108.846	0.635 / -38.480	0.635 / -38.480	0.334 / -20.387
2.700 GHz	0.449 / -112.655	0.632 / -40.020	0.632 / -40.020	0.334 / -21.278
2.800 GHz	0.458 / -116.416	0.629 / -41.563	0.629 / -41.563	0.333 / -22.178
2.900 GHz	0.468 / -120.129	0.625 / -43.108	0.625 / -43.108	0.333 / -23.085
3.000 GHz	0.477 / -123.791	0.621 / -44.655	0.621 / -44.655	0.332 / -23.999

Figure 8: List plot of S-parameters vs Frequency

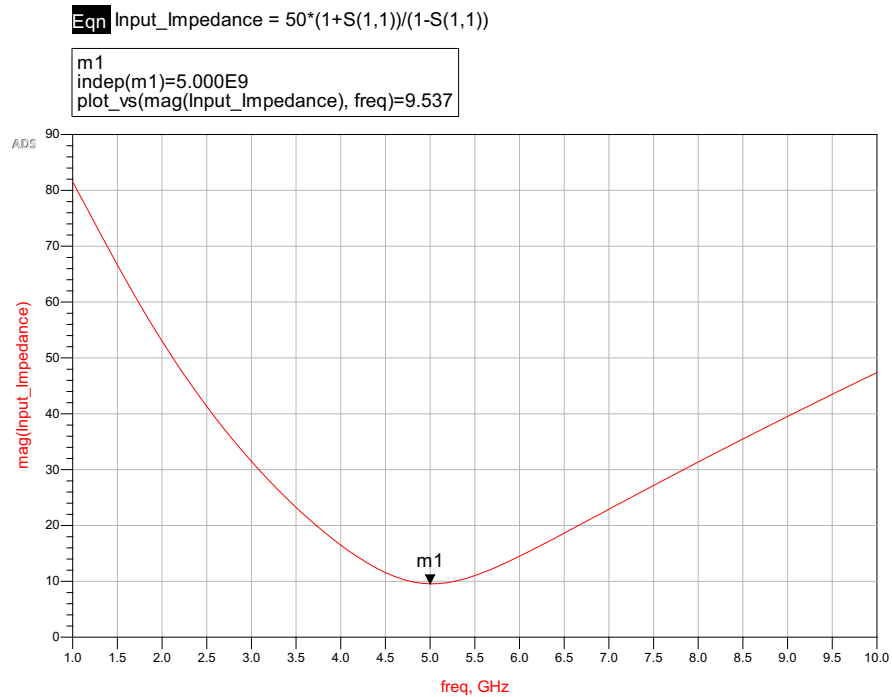


Figure 9: Magnitude (dB) of impedance vs Frequency

Problem 2

Schematic, simulation and visualization of practice circuit

S-Parameter Simulation

Linear Frequency Sweep

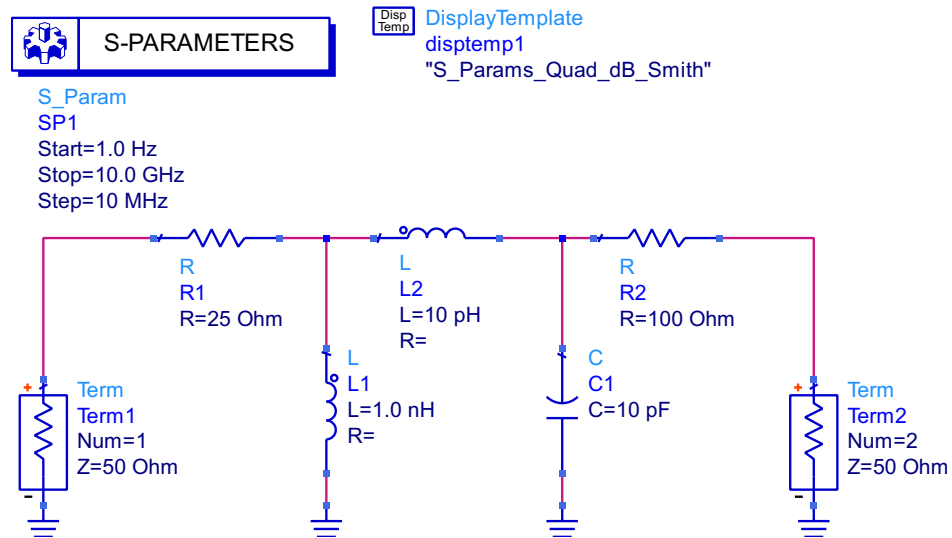


Figure 10: Given practice circuit for S-parameter simulation

Simulation plots

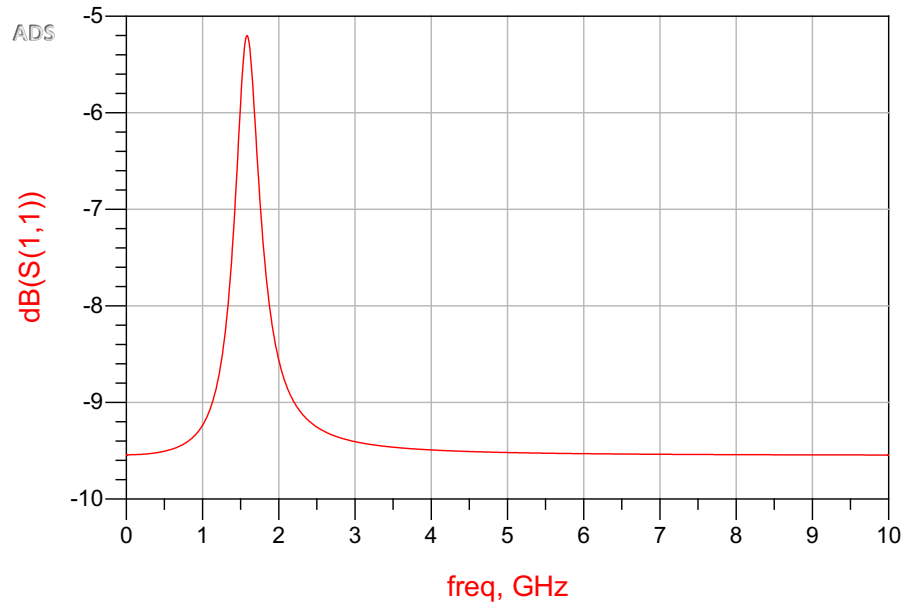


Figure 11: Magnitude (dB) of S_{11} vs Frequency



Figure 12: Phase (deg) of S_{11} vs Frequency

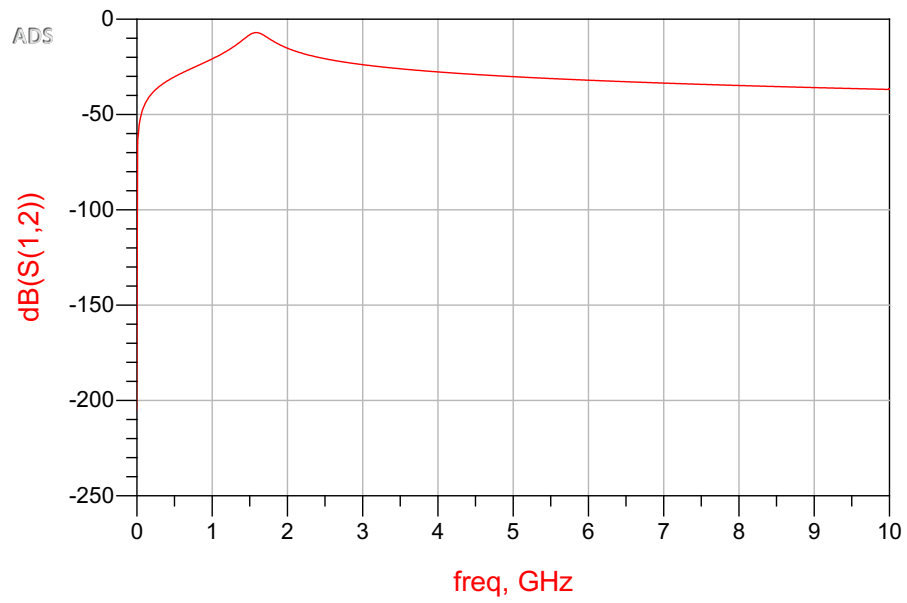


Figure 13: Magnitude (dB) of S₁₂ vs Frequency

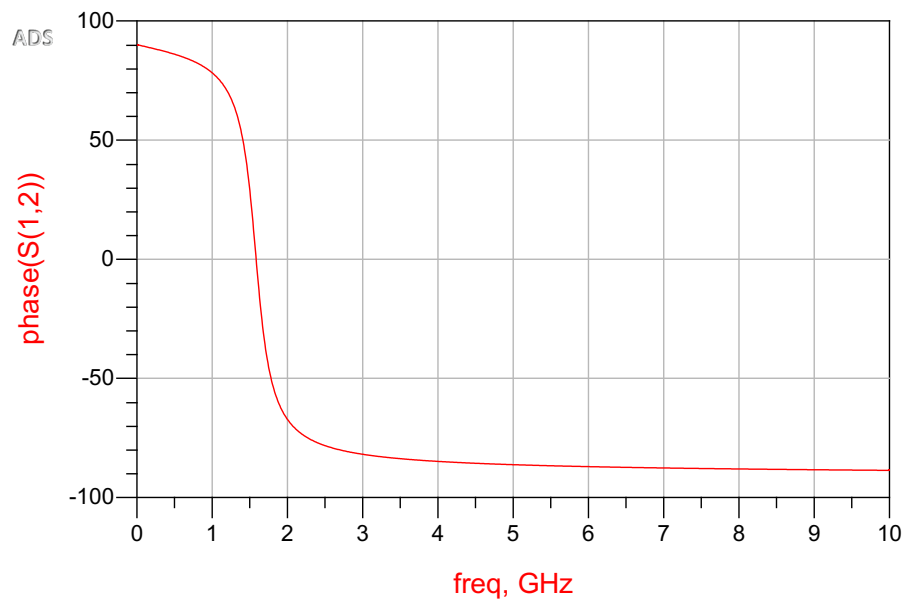


Figure 14: Phase (deg) of S₁₂ vs Frequency

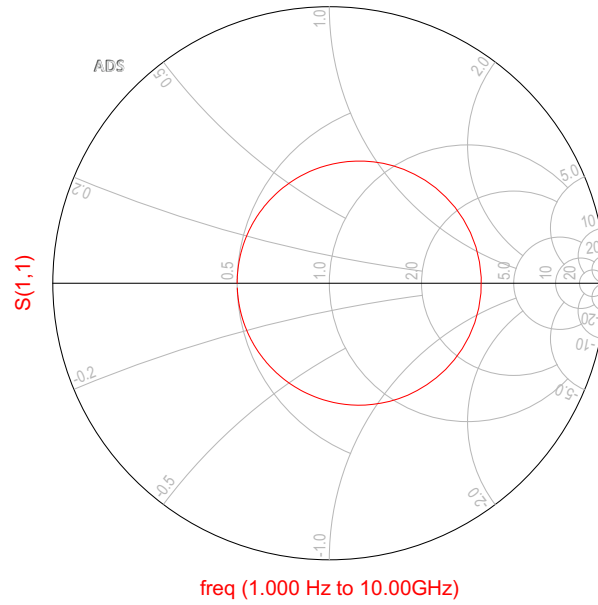


Figure 15: Smith chart of S_{11} vs Frequency

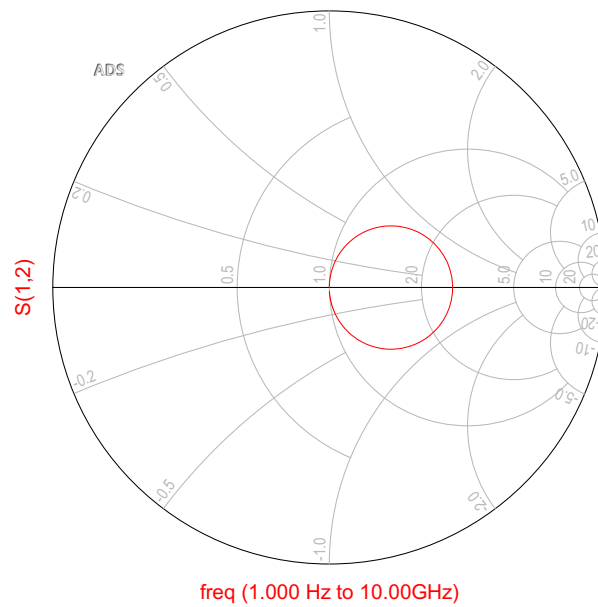


Figure 16: Smith chart of S_{12} vs Frequency

freq	var("S")			
	(1,1)	(1,2)	(2,1)	(2,2)
1.000 Hz	0.333 / 180.000	5.585E-11 / 90.0...	5.585E-11 / 90.0...	0.333 / 4.848E-9
10.00 MHz	0.333 / 179.808	5.585E-4 / 89.928	5.585E-4 / 89.928	0.333 / 0.048
20.00 MHz	0.333 / 179.616	0.001 / 89.855	0.001 / 89.855	0.333 / 0.097
30.00 MHz	0.333 / 179.424	0.002 / 89.783	0.002 / 89.783	0.333 / 0.145
40.00 MHz	0.333 / 179.232	0.002 / 89.711	0.002 / 89.711	0.333 / 0.194
50.00 MHz	0.333 / 179.039	0.003 / 89.638	0.003 / 89.638	0.333 / 0.243
60.00 MHz	0.333 / 178.846	0.003 / 89.566	0.003 / 89.566	0.333 / 0.291
70.00 MHz	0.333 / 178.653	0.004 / 89.493	0.004 / 89.493	0.333 / 0.340
80.00 MHz	0.333 / 178.460	0.004 / 89.421	0.004 / 89.421	0.333 / 0.389
90.00 MHz	0.333 / 178.267	0.005 / 89.348	0.005 / 89.348	0.333 / 0.438
100.0 MHz	0.333 / 178.073	0.006 / 89.275	0.006 / 89.275	0.333 / 0.487
110.0 MHz	0.333 / 177.878	0.006 / 89.202	0.006 / 89.202	0.333 / 0.536
120.0 MHz	0.333 / 177.683	0.007 / 89.128	0.007 / 89.128	0.333 / 0.585
130.0 MHz	0.333 / 177.488	0.007 / 89.055	0.007 / 89.055	0.333 / 0.634
140.0 MHz	0.333 / 177.292	0.008 / 88.981	0.008 / 88.981	0.333 / 0.684
150.0 MHz	0.333 / 177.095	0.008 / 88.907	0.008 / 88.907	0.333 / 0.733
160.0 MHz	0.333 / 176.898	0.009 / 88.832	0.009 / 88.832	0.333 / 0.783
170.0 MHz	0.333 / 176.699	0.010 / 88.758	0.010 / 88.758	0.333 / 0.833
180.0 MHz	0.333 / 176.501	0.010 / 88.683	0.010 / 88.683	0.333 / 0.883
190.0 MHz	0.334 / 176.301	0.011 / 88.608	0.011 / 88.608	0.334 / 0.934
200.0 MHz	0.334 / 176.100	0.011 / 88.532	0.011 / 88.532	0.334 / 0.984

Figure 17: List plot of S-parameters vs Frequency

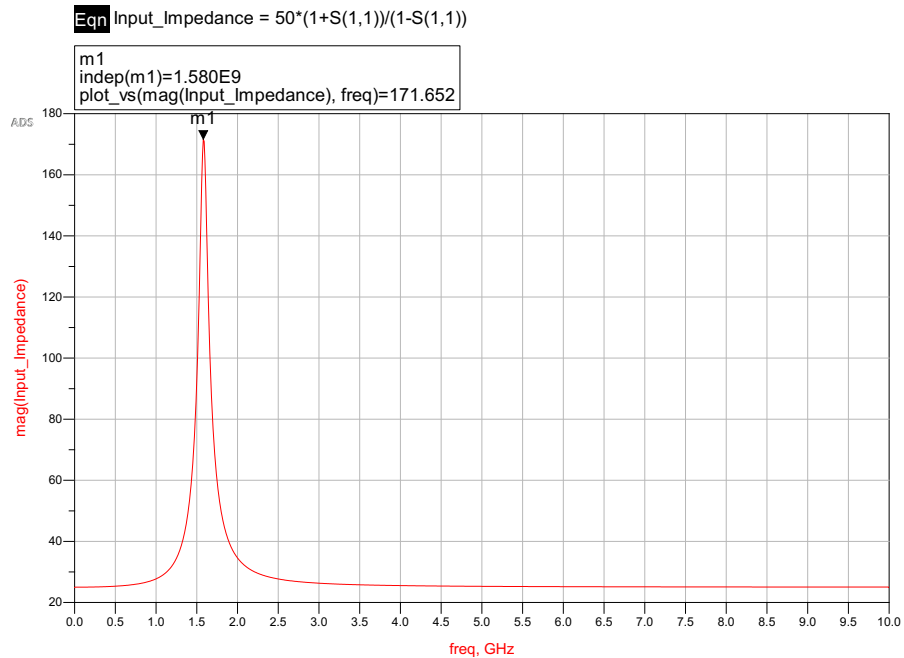


Figure 18: Magnitude (dB) of impedance vs Frequency