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RF uWave Lab

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Post-Lab Report #6

**Summary:** In this lab, students design and ideal hybrid quadrature coupler, then a realistic version. Finally, using optimization functions in ADS, students will tune their realistic circuits to behave much like the ideal versions. It should be noted that during this lab, due to the use of Linecalc, changes to the realistic circuit are minimal after optimization because the dimensions of the transmission lines were very accurate to begin with.

**Discussion:** We used one instance of gradient optimization, but, as mentioned in the summary, no significant changes were made to the line geometry because Linecalc produces such accurate results. Because only one optimization was needed, no real trends were observed in the change in difference in s-parameters.

**Gallery:**

A close up of a map

Description automatically generated

Figure : S21 and S31 S-Parameters

Figure 1 shows the reflection coefficients of S31 and S21 with a common peak around the design frequency of 2.5 GHz.

A close up of a map

Description automatically generated

Figure : Phase of S21 and S31

Figure 2 shows that, once corrected for the measurement limit of values being between -180 and 180 degrees, the phase of each S-parameters are always about 90 degrees out of phase.

A screen shot of a computer

Description automatically generated

Figure : Realistic Coupler Before Optimization

Take note of the geometric values for the transmission lines under the Var block.

A close up of a map

Description automatically generated

Figure : S-Parameters of Coupler Before Changes

A close up of a map

Description automatically generated

Figure : Magnitude Differences before changes

A close up of a piece of paper

Description automatically generated

Figure : Coupler After Optimization

A close up of a map

Description automatically generated

Figure : S-Parameters and Differences after Optimization

Notice, because of Linecalc’s accuracy, the before and after graphs look practically identical.