Yield_Optimization

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Design Notes

Running Yield Optimization

Using Yield Optimization allows designers to set the values of their parameters to ensure maximum yield of the the circuit they design. Yield optimization is easy to use in Microwave Office, as long as there is an understanding of what the three parameters that are part of yield optimization mean.

Maximum Iterations

When the optimizer reaches this number of iterations, it will stop simulating. The is the maximum number of optimization iterations run, not the maximum number of yield iterations run per optimization iteration.

Dampening

Dampening sets the size of corrections used for each iteration. A value close to one gives large corrections.

Yield optimization will get the Ysens data (the statistical distribution as shown in the "Sensitivity" graph) for each variable that is set to do yield optimization and try to center the distribution. So if the Ysens data shows that the peak yield for the inductor was at 9.8 pF instead of 10.0 pF; with a dampening factor of 0.5 it would try the value 9.9 pF on the next iteration.

Maximum Error

The maximum error corresponds to the 'epsilon' value in the error equation in the "Yield Analysis" section of the MWO/AO User Guide. The yield optimization is hard coded with a confidence level of 95.4% (c-sigma = 1.96). For each optimization iteration, yield iterations are run until the estimated error is less than the given maximum error. So if the number is larger, the solver will run fewer iterations before it restarts with a new value.

Simple Bandpass Filter

The schematic named "Filter" shows a simple lumped-element bandpass filter. A yield goal of -18dB between 4.4 and 5.2 GHz has been set. Running a simple yield analysis by clicking Simulate>Yield Analysis, and setting the maximum number of iterations to 1000 allows the user to see the shape of the yield sensitivity histogram in the graph labeled "Sensitivity". You can also see the performance variation of the filter in the "Return Loss" graph.

You will notice that the shape of the sensitivity histogram shows that lower values of the inductor (L1) result in higher yield. This means that decreasing the value of L1 should result in better overall yield. Yield optimization will allow us to determine what the best value of L1 should be.

Press Clear on the Yield Analysis dialog and change the Analysis Methods to "Yield Optimization". Make sure the Maximum Iterations is set to 10, the Dampening is 0.5, and the Maximum Error is 0.05. Now press the Start Button.

After all the iterations have completed, the value of the inductor should have changed to approximately 9.5 nH. You will also see that the sensitivity distribution is now centered, showing that 9.5 is in fact the optimum value of L1.

It is always recommended to bring a circuit near optimum performance using tuning and optimization before performing yield optimization.

Schematic - Filter