

Microstrip Bandpass Filters

A microstrip bandpass filter is modeled in FEKO to determine its S-parameters.

Filters are of the most common components in any communication network and in microstrip form, integration with other components is easily achieved. In [1] a design for a bandpass filter at 4.0 GHz in microstrip form is given and its performance is evaluated as one of the design parameters is changed. Figure 1 shows the layout of the filter and the variable parameters₁. This filter is modeled in FEKO and a grid search algorithm in OPTFEKO is used to determine a value for s_1 resulting in the smallest reflection coefficient at 4.0 GHz.



Figure 1: Microstrip filter layout

Figure 2 shows the input reflection (relative to 50 Ohm) of the filter as the spacing s_1 is varied. From the results in Figure 2 a spacing of $s_1 = 0.53$ mm is chosen for the final design of the filter. The S-parameters for this final design is shown in Figure 3. The filter has an $S_{11} < -10$ dB passband of about 40 MHz (~1%) and S_{11} is nearly -40 dB at 4.0 GHz.



Figure 2: Reflection coefficient at 4.0GHz for variable s1



Figure 3: S-parameters of bandpass filter

References

[1] J. Zhu, N.K. Nikolova, J.W. Bandler, "Self-Adjoint Sensitivity Analysis of High-Frequency Structures with FEKO", ACES 2006.