

Five Pole H plane Iris Filter

1. Description

We present in this example a validated 5 pole H-plane Iris Filter (WR75) : We compared the simulated results from HFWorks to those measured and plotted in [1]. The bandpass filter is composed of five Irises of 0.05 inch thickness. The dimensions of the cavities and Irises' windows are shown in the next figure. The filter was implemented inside a WR75 waveguide and it has shown good performances over the 11.5 to 12.5 GHz frequency band (Satellite communications).

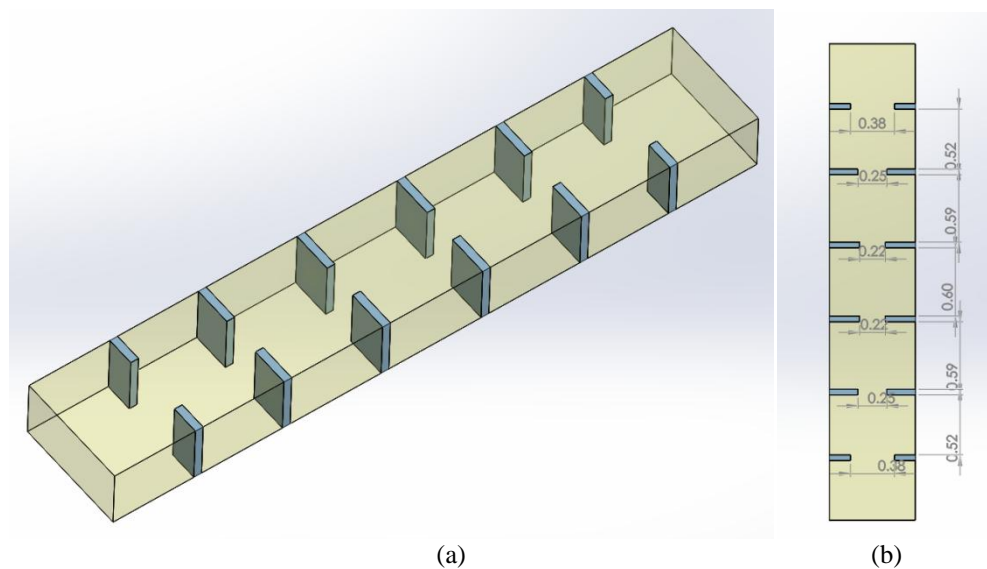


Figure 1: (a) 3D view and (b) dimensions of the iris filter

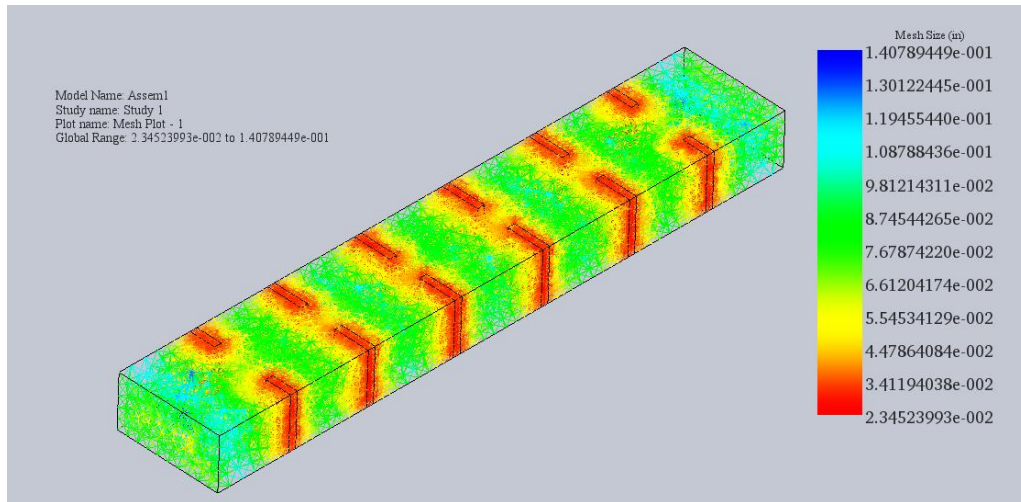
2. Simulation

The Scattering Parameters solver of HFWorks is suitable for filters' analysis. The study computes several parameters in different formats and outputs different plots. In the results folder, we will be most interested in the return and insertion loss of the filter. We can specify a fast sweep frequency plan as it is suitable for almost all filters' studies. The PEC waveguide is plunged in an air box and two ports are assigned to the lateral faces of the structure.

The simulated study provides multiple choices and options to plot. They also offer the exploitation of electrical parameters calculated in Scattering Parameters simulations (insertion, return losses...etc).

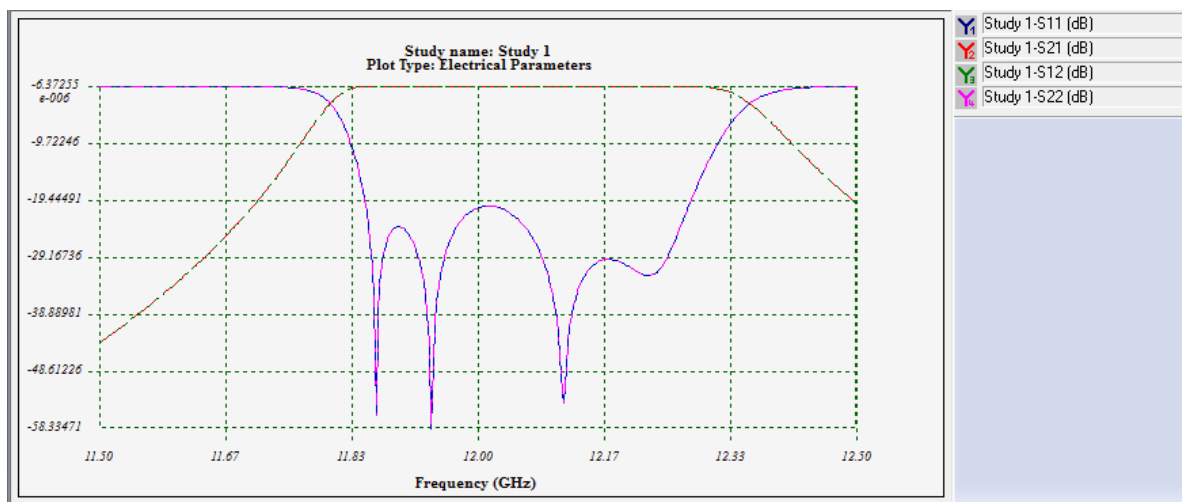
3. Load/ Restraint

The ports can be calibrated (i.e. polarized) using an integration line to specify the electric field orientation. The Irises are treated as Perfect Electric Conductors. A fine mesh is preferably applied to these Irises because their dimensions are critical.



4. Results

To validate the simulation's accuracy, we can have a look at the return loss and insertion loss curve. The curve shows that the simulator captures perfectly the stopped band. As mentioned in the beginning of the report, the fast sweep plan was used in this example; Nevertheless, The discrete sweep gives more accurate results but requires longer simulation. The following figures show the simulated and measured curves:



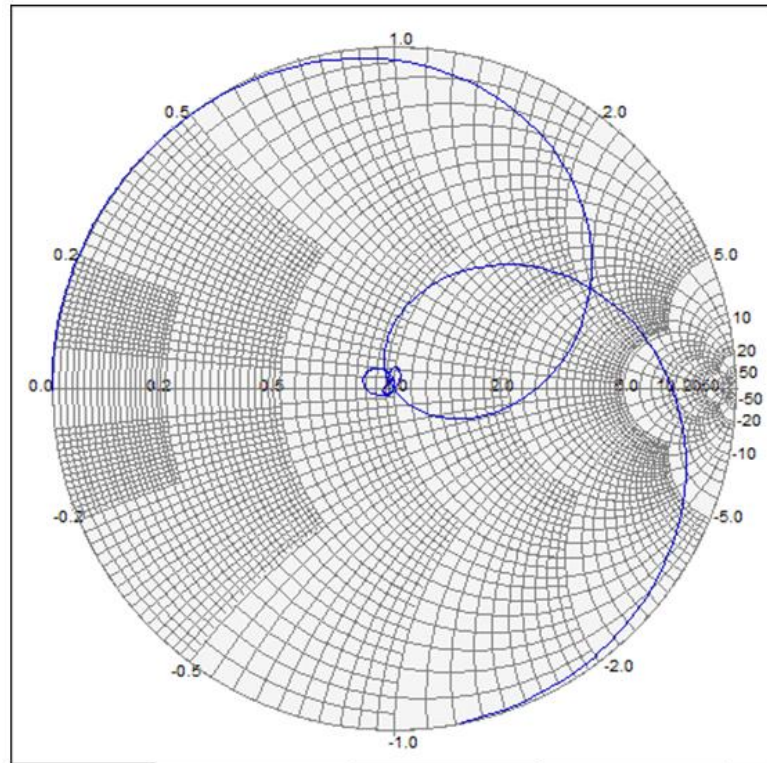


Figure 1: Simulated Return loss in HFWorks (2D and Smith Chart)

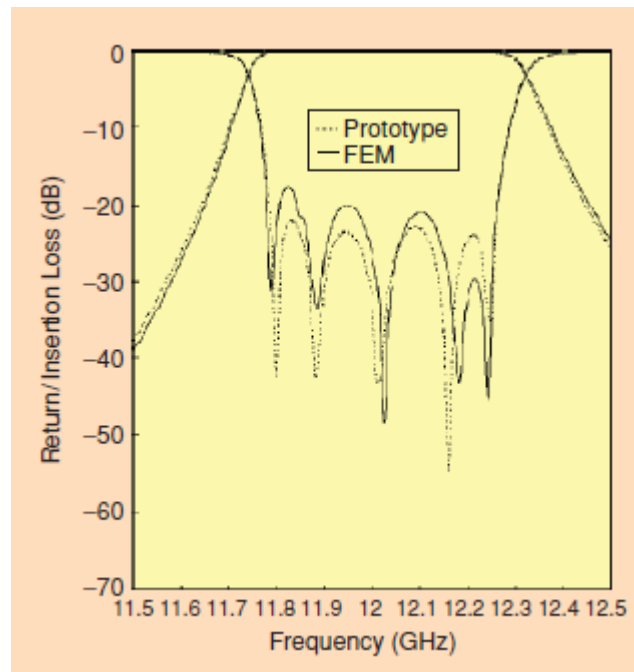


Figure 2: Measurements as shown in [1]

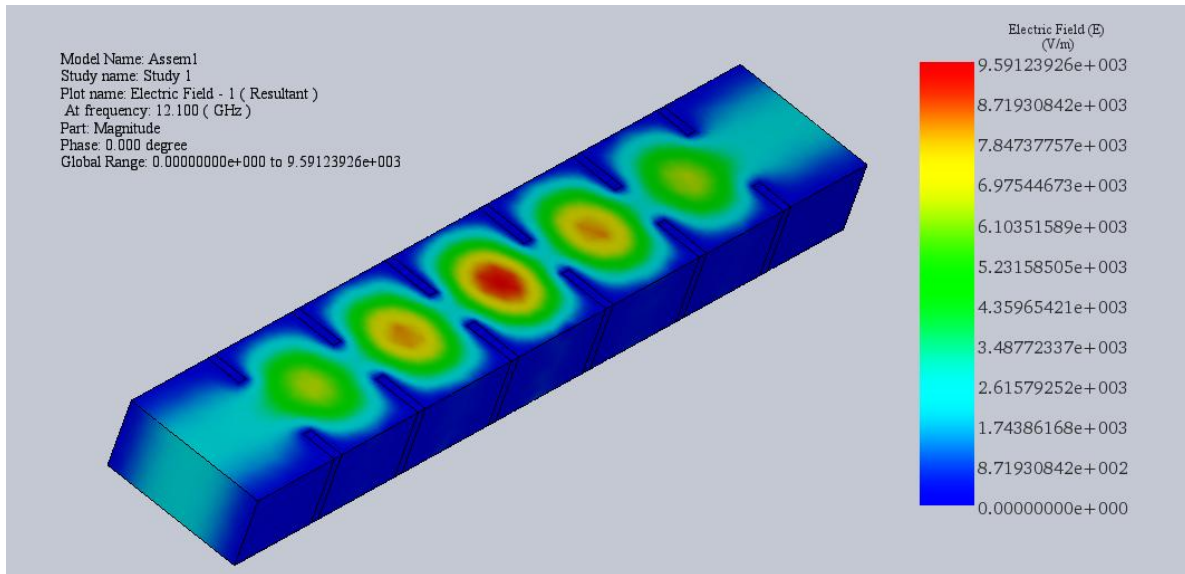


Figure 3: Near electric field distribution

5. References

[1] Power-Handling Capability for RF Filters Ming Yu IEEE Microwave Magazine