

TEST CASE 1 : Waveguide filter

S parameters of a 5 poles waveguide filter

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Abstract :

This test case concerns the simulation of the reflection and transmission coefficient of a waveguide filter. The filter is composed of three cylindrical cavities each of one including the presence of screws. The cavities are coupled by 2 iris, output and input being standard rectangular waveguides coupled to the cavities by iris.

Geometrical file under the IGES format is available.

1. Definition of the Geometry

The target is a cylindrical 5 poles filter. The scheme of the filter is presented figure 1. All the dimensions are given in millimetre (mm).

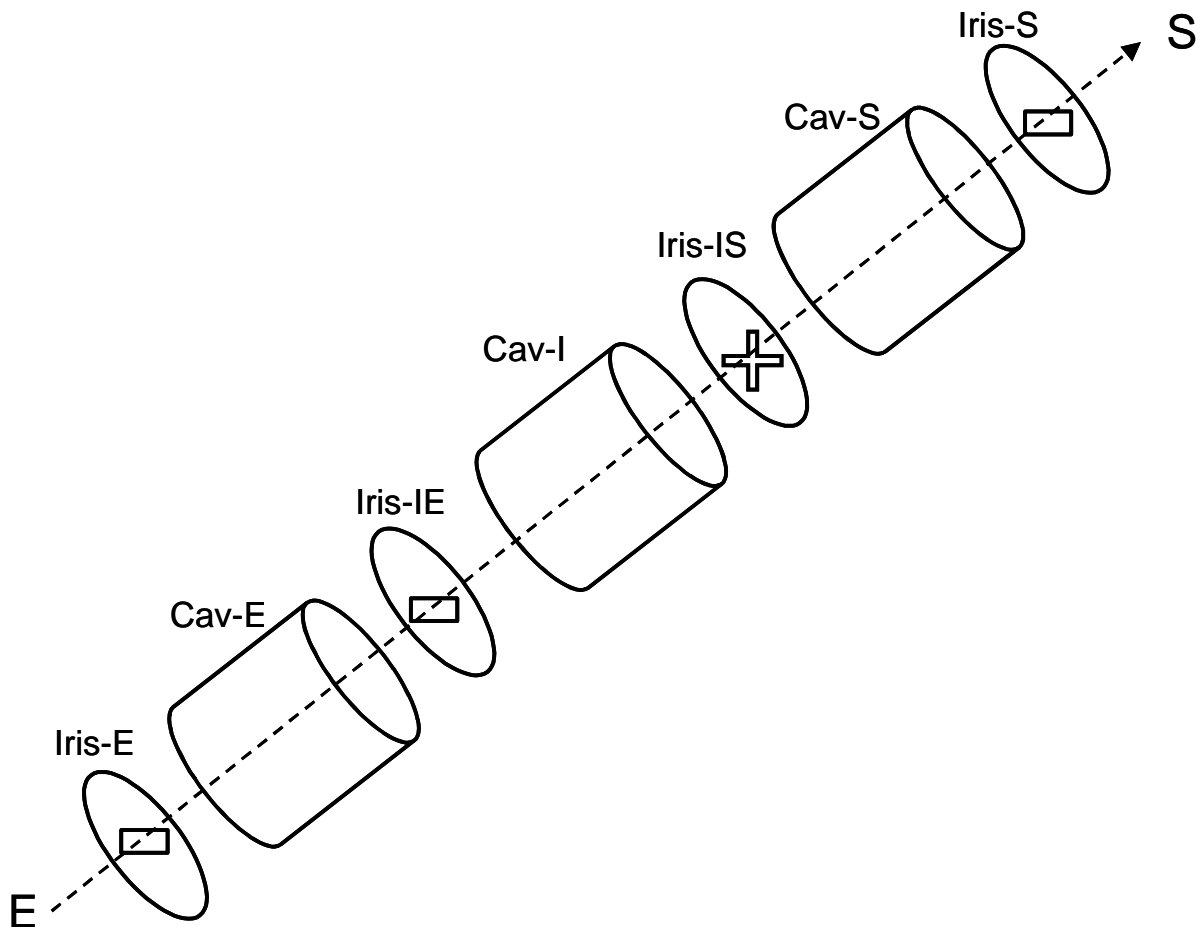


Figure 1 : scheme of the filter

The filter is composed of three cylindrical cavities, each of one including the presence of screws. The cavities are coupled by 2 iris, output and input being standard rectangular waveguides coupled to the cavities by iris. Geometrical file under the IGES format is available.

Figures 2 gives the dimensions of the cavities, the location and penetration depth of the screws. The screws are cylindrical with identical diameter equal to 2mm. Figure 3 gives the dimension and thickness of the iris.

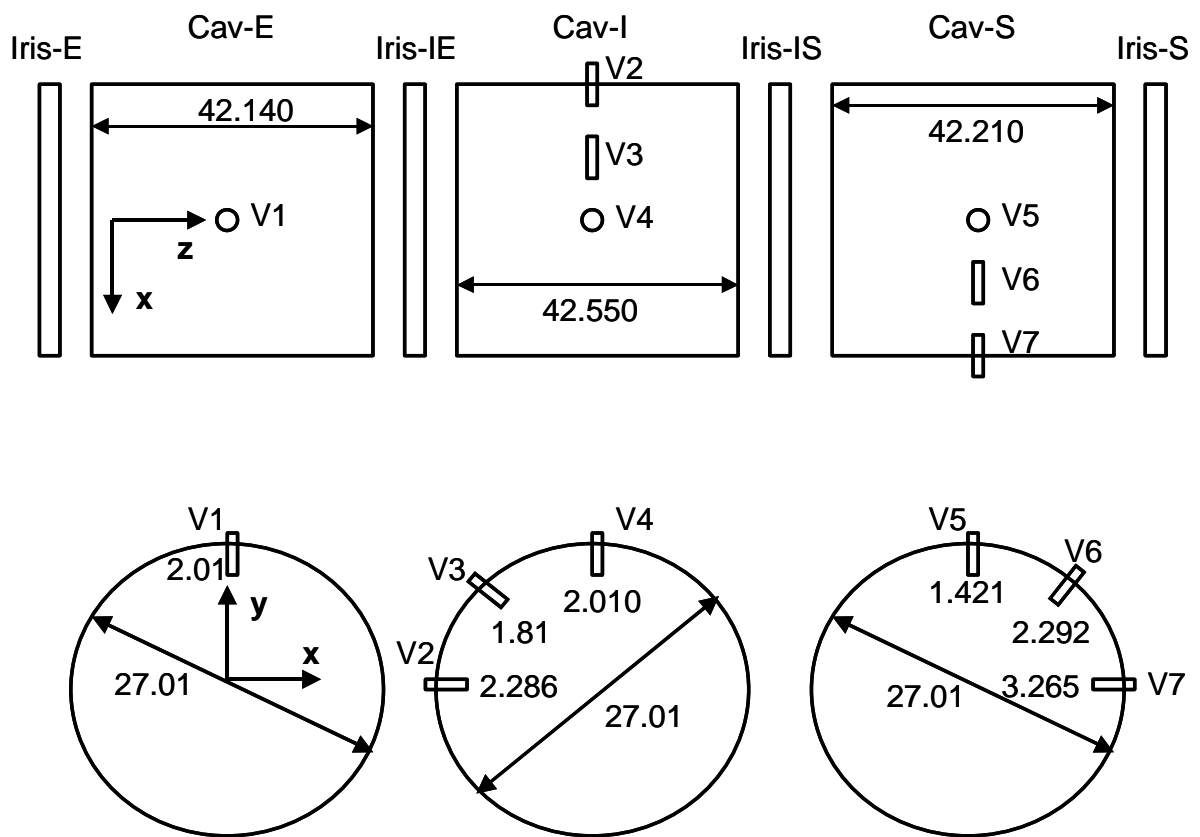


Figure 2 : cavity dimension, location and screws penetration depth

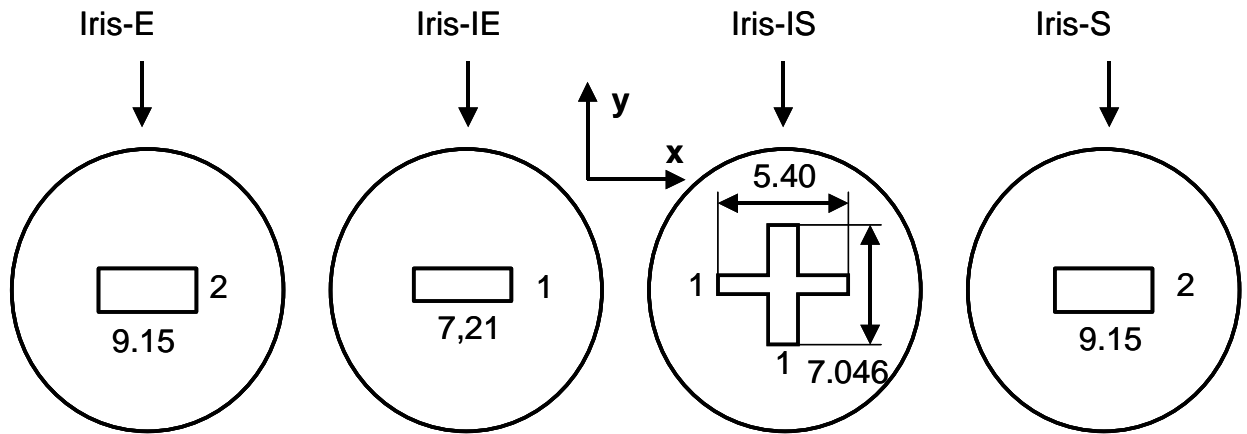
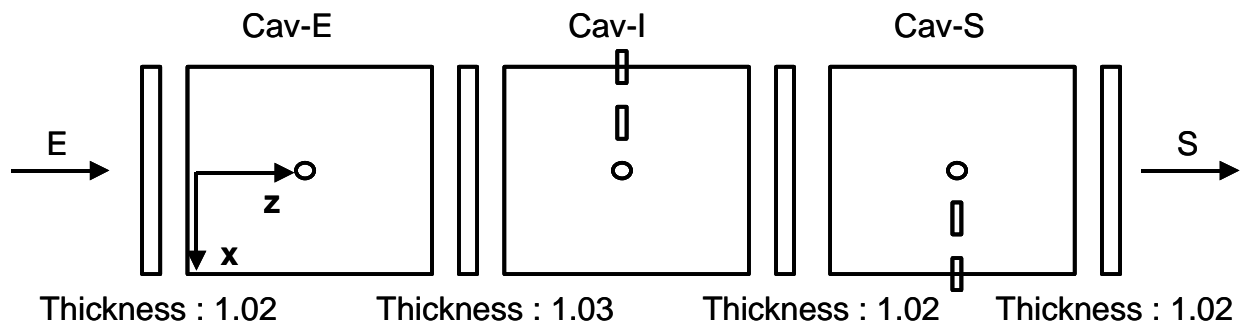
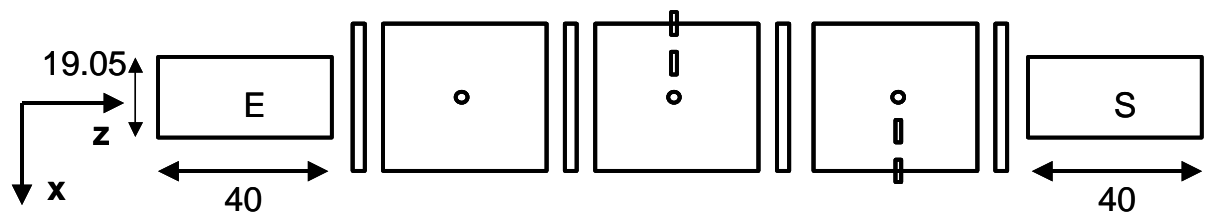


Figure 3 : Iris definition

The input E and the output S are identical rectangular waveguides with length 40mm and cross section 19.05 x 9.525 as shown in figure 4.



E and S access are identical rectangular waveguides

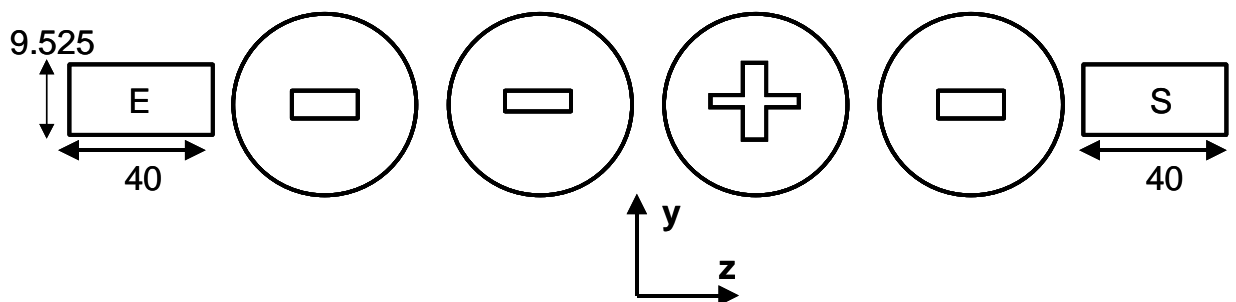


Figure 4 : E and S definition

2. Simulation Parameters

The fundamental TE₁₀ rectangular waveguide mode normalized to 1 Watt on the E and S access will be considered during the computation.

The parameters to be simulated are the Scattering parameters S_{EE} (reflection coefficient at the input E) and S_{ES} (transmission coefficient at the output S) over the frequency range from 12.3 GHz to 12.4 GHz with a 1MHz step (101 frequencies).

3. Data Formats

The results will be stored in one ASCII file:

The file will contain on each row the data :

$$(f, S_{EE}, S_{ES})$$

where f is the frequency in GHz, S_{EE} and S_{ES} in dB ($20 \cdot \log_{10}(S)$)