

BROADBAND TAPERED SLOT ANTENNA ARRAY

The properties of a 2-6 GHz dual polarised array consisting of two displaced co-located linear polarized arrays, each consisting of 7x8 tapered slot elements was analyzed using the efield® time-domain FDTD solver. The scattering parameters when a central element was excited was computed. From the scattering parameters the active reflection coefficient for the excitation element was computed.

Antenna element

The tapered slot antenna element is shown in Figure 1:

- Length: 110mm
- Width: 21.6 mm
- Thickness: 3.0 mm
- Substrate: $\epsilon_r=2.2$



Figure 1: Tapered slot antenna element

Antenna array

Double polarized antenna array of 7 x 8 elements.

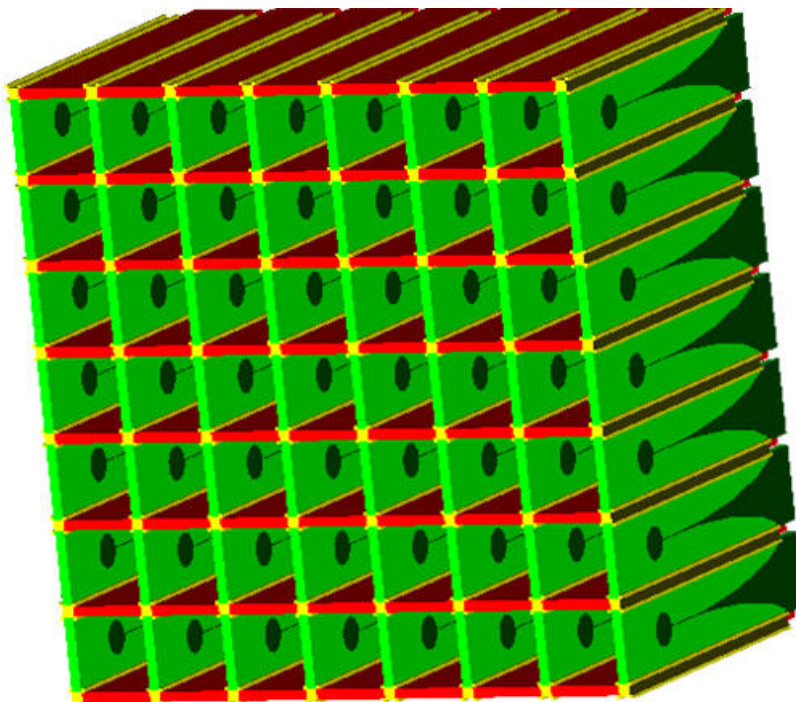


Figure 2: Tapered slot antenna array

Simulation with Efield®

The element no. 54, see Figure 3, was excited using a waveguide port to excite the TEM mode. In all other antenna elements ports was used to register the backward propagating fields and compute the coupling between the excited element and all other elements. From the coupling the active reflection coefficient was computed in the E- and H-plane.

Model and simulation data:

- Cell size: 0.5 mm
- Number of cells: 243 x 377 x 377
- Number of time steps: 20 000
- Port excitation, TEM-mode
- 2 x 7 x 8 ports

From the coupling the active reflection coefficient was computed for the element 54. Figure 4 and 5 shows the VSWR for the active reflection coefficient for scanangles in the E- and H-plane as a function of frequency. Blue color show VSWR of two, green VSWR of three and red VSWR of four.

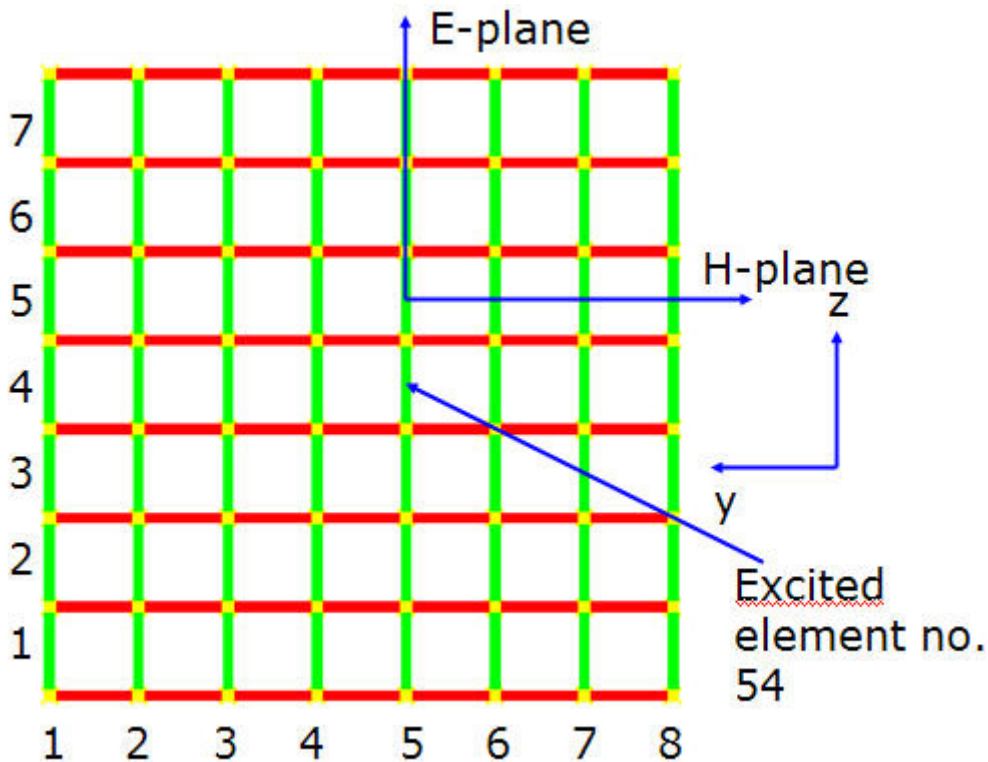


Figure 3: Tapered slot antenna array

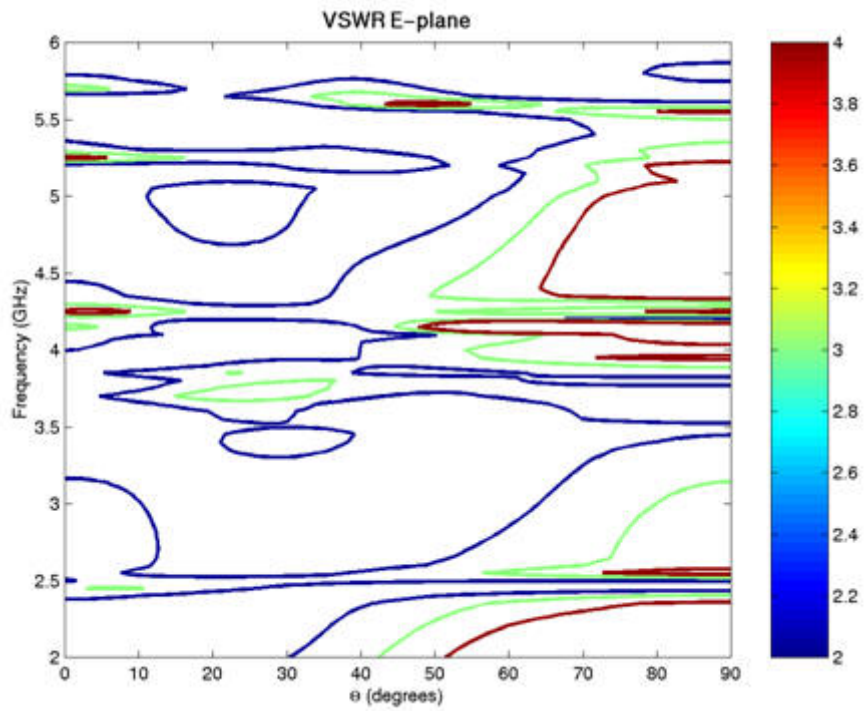


Figure 4: Active reflection coefficient in E-plane

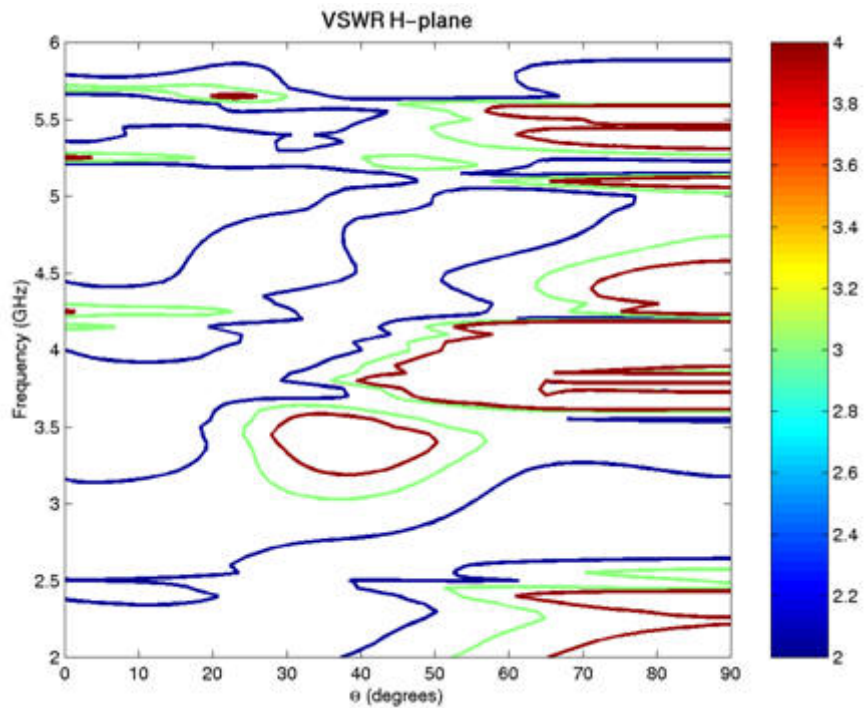


Figure 5: Active reflection coefficient in H-plane

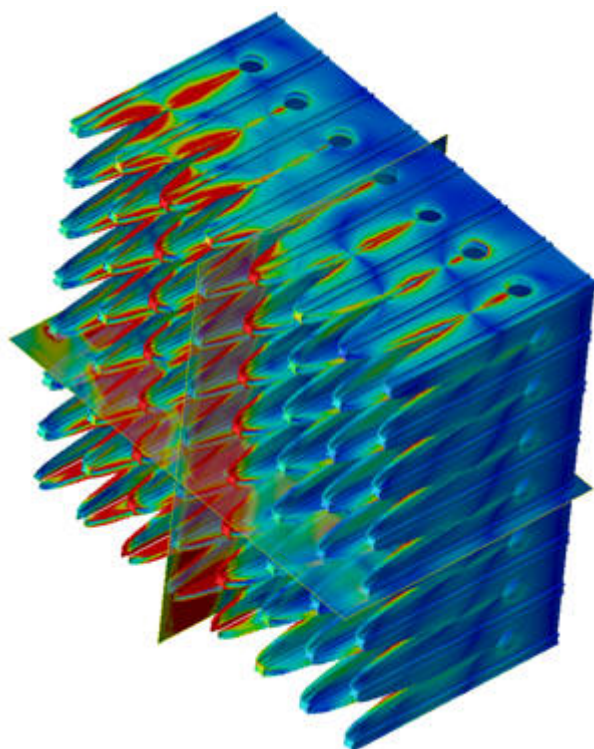


Figure 6: Visualization of surface currents and fields

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