Dual-Polarized Slot-Coupled Planar Antenna With Wide Bandwidth

This note is based on the article "Dual-Polarized Slot-Coupled Planar Antenna With Wide Bandwidth" by Shi-Chang Gao, Le-Wei Li, Mook-Seng Leong and Tat-Soon Yeo, IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, VOL. 51, NO. 3, MARCH 2003.

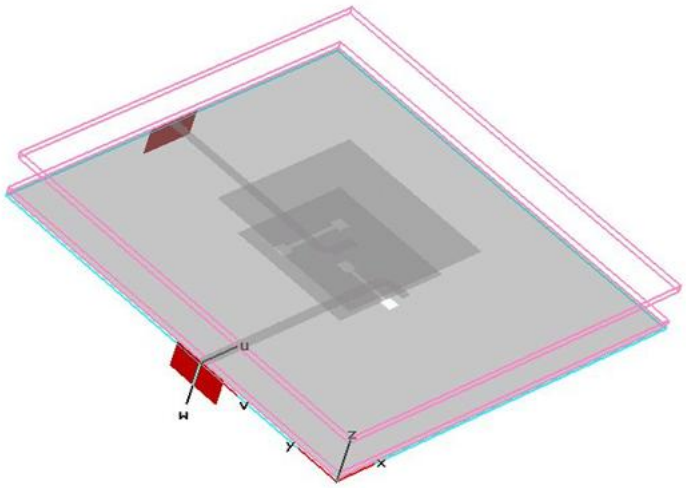

Figure 1: Geometry of the Dula_ploarized Slot-Coupled Planar Antenna

Figure 1 shows the geoemtry of the dual polarized slot coupled planar antenna. The antenna consists of three dielectric substrate layers and one air layer. The upper square patch is mounted on the back of substrate 1. .The lower square patch is put on substrate 2. An air layer separates the two radiating patches. The 50 Ohm microstrip feed lines are mounted on the back of substrate 3, while one ground plane is inserted between substrates 2 and 3.

Figure 2 provides a closer look at the structure. The lower radiating patch is excited on two orthogonal edges by two H-shaped slots which are placed in a “T” configuration, The correct dismension for the for the patches and slots as well as the thicknesses and dielectric properties of the substrate layers can be found in the reference paper.

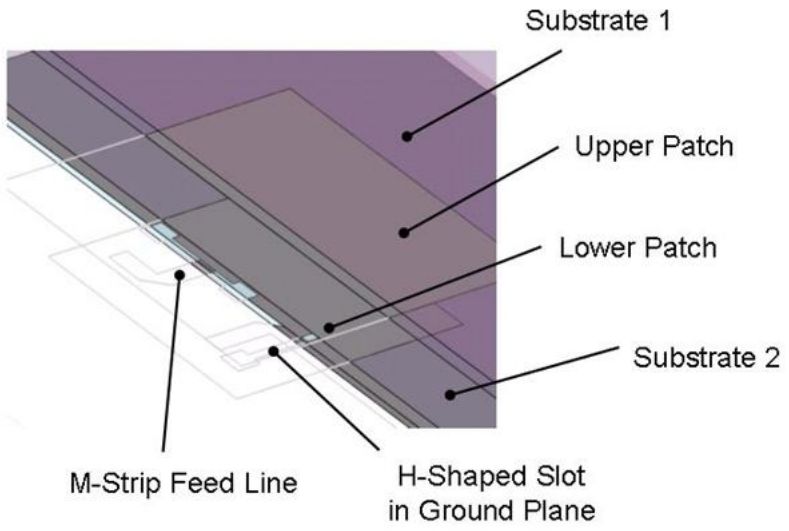

Figure 2: Detaild view of the antenna sttructure

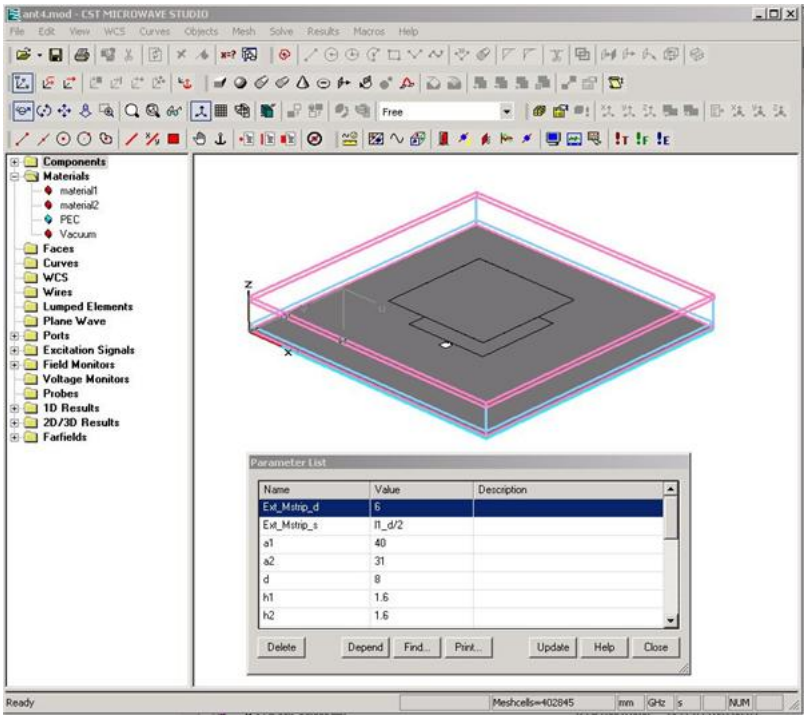

Figure 3: Full parameterized geometry setup in CST MICROWAVE STUDIO®

Figure 4 shows the published measurement results for the antenna. The measured return loss exhibits an impedance bandwidth of over 20% and the isolation between two polarization ports is better than 36 dB. Figure 5 and 6 show the corresponding simulation results form a CST MICROWAVE STUDIO® calculation. Since the correct length of the microstrips stubs is not published in the paper, a parameter sweep on this dimension was performed. The simulation results show that the impedance bandwidth and the position of the a large impedance bandwidth for a set of parameters. The position of the return loss minima depends on the exact length of the tuning stubs.

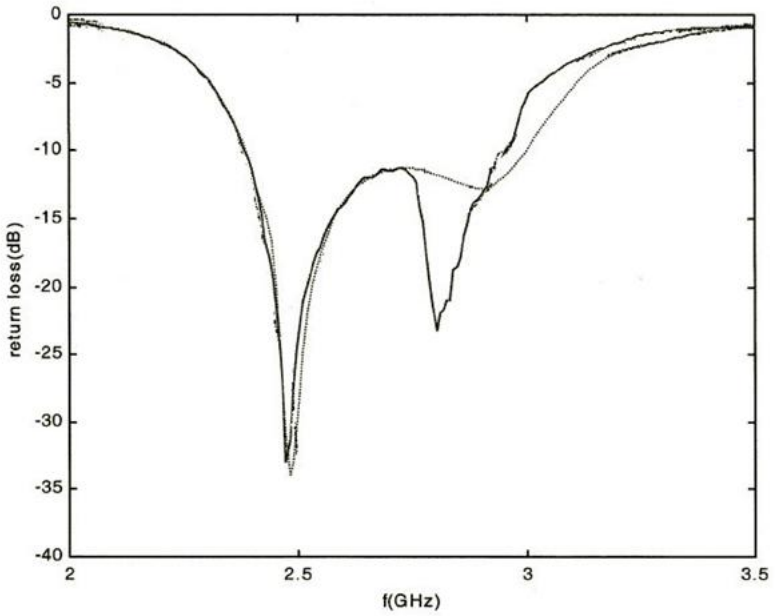

Figure 4: Published return loss for the slot coupled planar Patch Antenna. The Impedance Bandwith

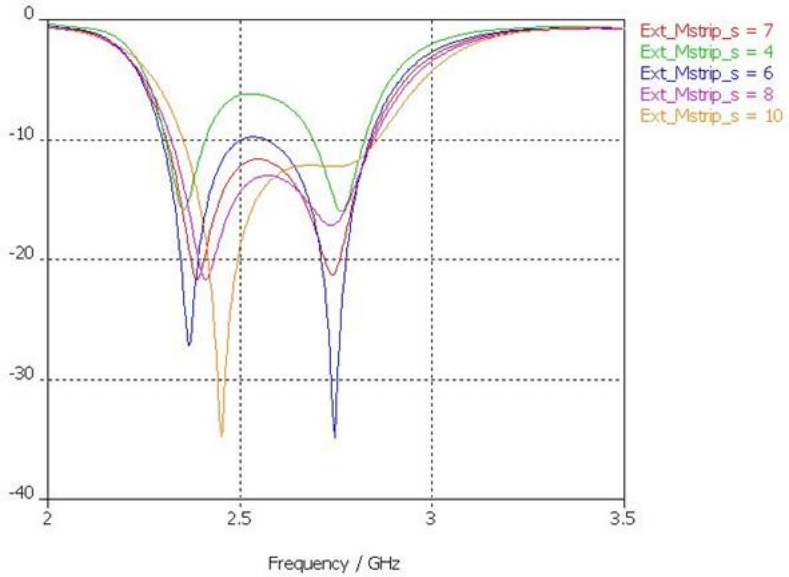

Figure 5: S-Parameter as a function of the length of the microstrip matching stub for port 1

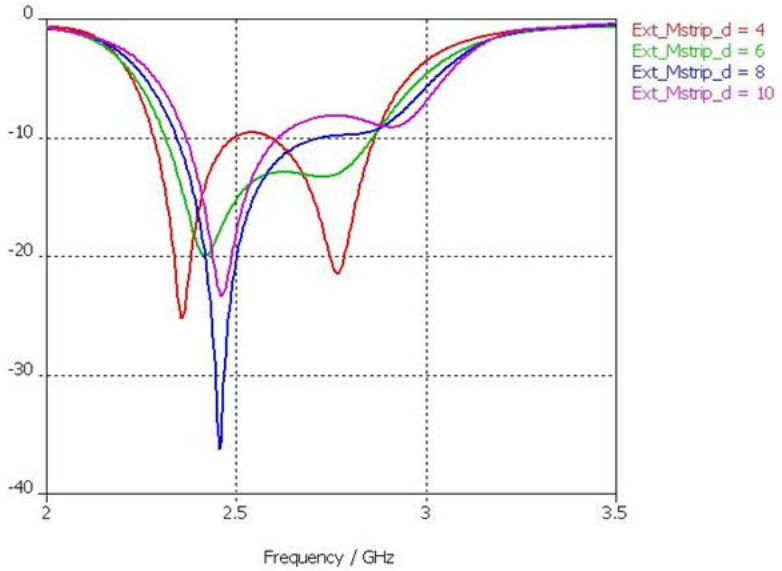

Figure 6: S-Parameter as a function of the length of the Microstrip matching stub for Port 2

Figure 7 shows the return loss for both ports and the port isolation for a certain set tuning stub lengths.

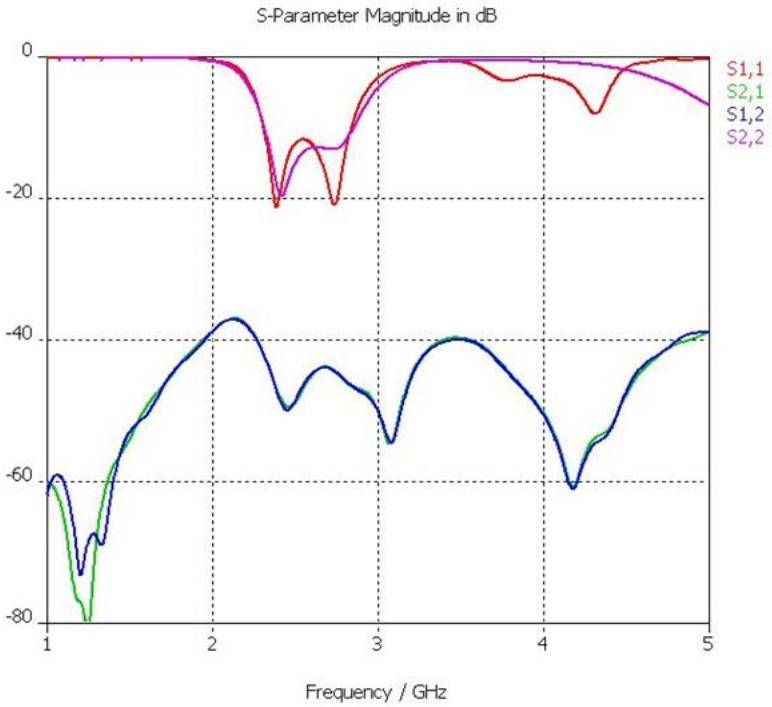

Figure 7: Return Loss and isolation for a set of parameter

Figure 8 shows the horizontal and vertical polarization of the farfield at 2.68 GHz. The simulated gain for this antenna is 9.2 db, the maximum cross-polarisation level -14 dB. This maximum is reached in the 45 deg plane. In the E and H plane, the cross-

polarisation level is less the 28 dB.

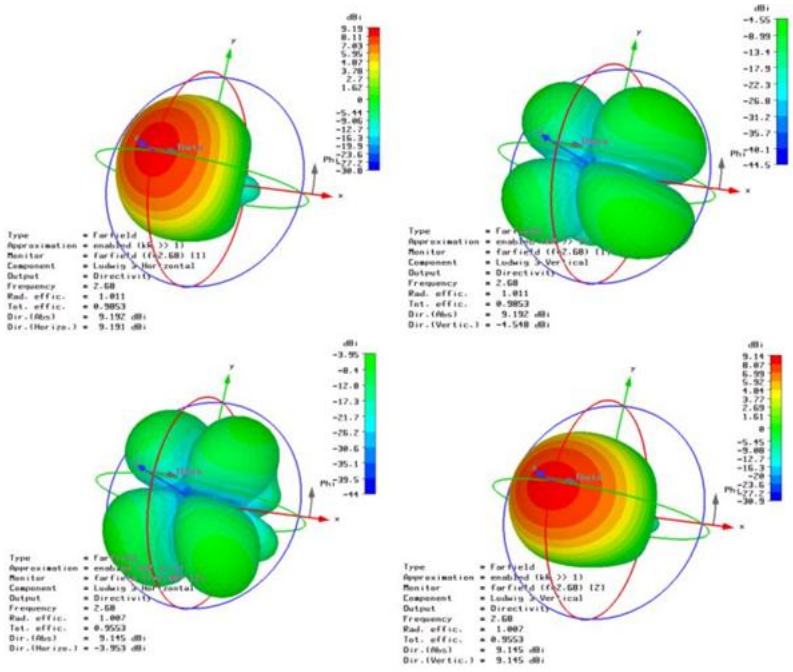

Figure 8: Horizontal and vertical polarization of the farfield at 2.68 GHz.