

Wideband Microstrip Array Antenna Using Reactive Surfaces

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I. Introduction

Recently, there there have been some efforts to enhance the bandwidth of the microstrip patch array antennas. For the compromise of system cost between the bandwidth of the patch array antenna, moderate slement spacing is desirable. In this paper, we propose a reactive surface (RS) loaded patch array to increase the bandwidth of the antenna while keeping a moderate element spacing of the array [1].

II. Proposed Antenna Model and Analysis

Figure 1 shows an exploded view of a probe-fed patch array loaded with RS. The periodicity of the RS is different from that of the driven patch elements. The unit cell size of the driven patch is assumed as $a_1 \times b_1$, and the substrate thickness is h_1 .

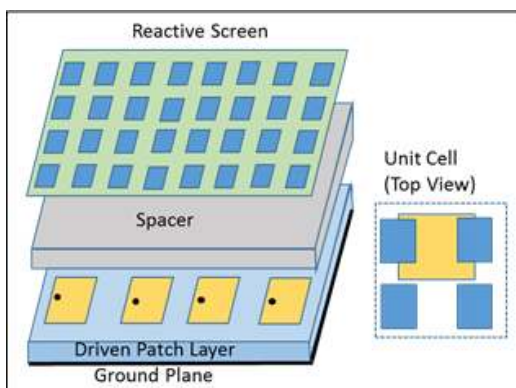


Figure 1: Schematic of a patch array loaded with a reactive screen. The overall unit cell of the array is also shown.

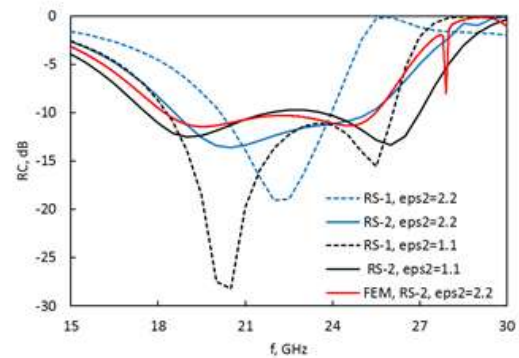


Figure 2: Input reflection coefficients of 4 patch arrays loaded with reactive surfaces. The patch dimensions are optimized for the best performance. The parameters are: $a_1=b_1=0.8\text{cm}$, $h_1=0.0734\text{cm}$, feed probe diameter= 0.05cm , probe location 0.04 cm from patch edge. --- $L=0.404\text{ cm}$, — $L=0.392\text{ cm}$, - - - - - $L=0.460\text{cm}$, — $L=0.430\text{ cm}$, — $L=0.392$, (L = patch length of driven square patches).

The spacer thickness is h_2 and the cell size for the elements of RS is $a \times b$. Based on this structure, We investigated the optimized size of RS and analysis will be discussed at the site.

III. Conclusion

In this paper, we have optimized the periodicity of reactive screens for the impedance enhancement of the patch array antenna. Detailed analysis will be shown at the site.

Acknowledgement

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References

[1] A.K. Bhattacharyya, Phased Array Antennas—Floquet Analysis, Synthesis, BFNs and Active Array Systems, Wiley, 2006.