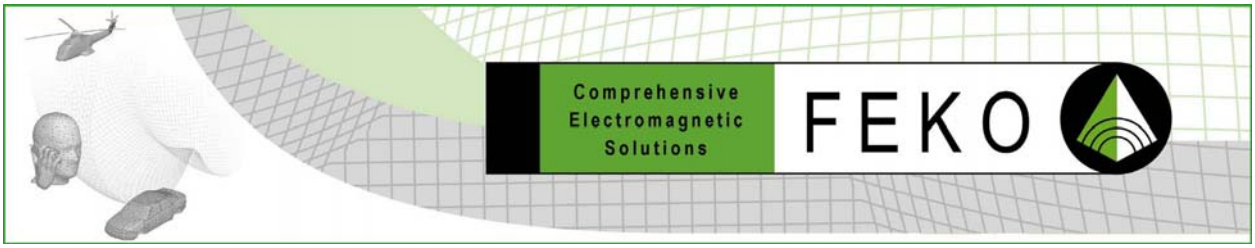


Frequency Selective Surface Modeling with the MLFMM

An example of how the MLFMM may be used to simulated finite size FSSs

Frequency Selective Surfaces (FSS) are used in various applications to act as spatial filters, allowing radiation at certain frequencies to pass through them and scattering others. FSSs typically consist of periodic arrays of conducting elements on the substrates, or slots of some kind as aperture in a conducting plane. Such structures require careful simulation as resource requirements for finite structures scale very quickly. FEKO is ideally suited to the analysis of such structures through its implementation of the Multilevel Fast Multipole Method (MLFMM).

Problem description

A finite FSS consisting of a 7 x 7 grid of identical elements are constructed, with the individual elements consisting of cross-dipoles printed on both sides of a dielectric slab. The geometry of the FSS and the individual elements are depicted in Figure 1. The dimensions of the array element and substrate are:

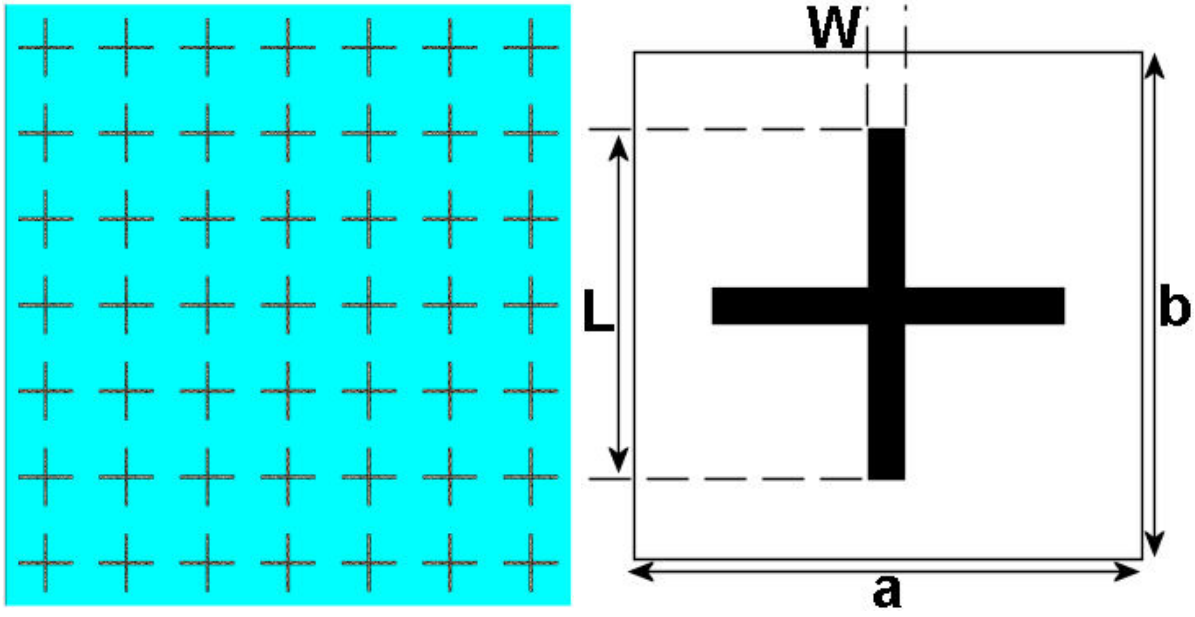
- a = b = 75 mm.
- L = 50 mm.
- W = 2.5 mm.
- d = 12.5 mm (dielectric height).
- ε_r = 3.78 (relative permittivity).

A plane wave is used as illuminating source, with $\theta = 45°$, $\phi = 0°$ and the electric field polarised along the ϕ-axis (y-directed).

Figure 1: FSS geometry

(a) Array

(b) Element



Simulation results

The scattered far-field pattern was computed for the simulation scenario described above. Figure 2 presents a comparison between the Method of Moments (MoM) and MLFMM results for a 7 x 7 array and adds an MLFMM result for a 13 x 13 array.

Figure 2: Scattered Far-field from the FSS