# Design of a Multilayer 45-Degree Wideband Polarizer (6 – 18 GHz)

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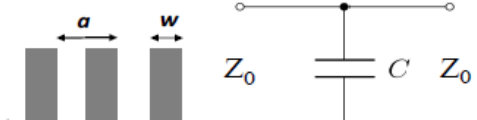
## Objectives

- **Proposition of an optimisation method for any x-degree wideband multilayer linear polarizer.**
- **Describe the optimisation method which consist of a combination of the transmission line equivalent circuit and a Genetic Algorithm to estimate the best values of the dimensions of the polarizer.**
- **Validation of the approach by optimizing a wideband [6 – 18 GHz] five layers' 45-degree polarizer and stacking it to different Patch antennas resonating at different frequencies.**

## Optimization Method of the x-Degree Linear Polarizer

The proposed concept is presented in the figure 1 for a five layers 45-degree polarizer. The periodic arrangement of strips, illuminated perpendicularly to the surface, can be modelled using TL theory as lumped capacitance or inductance depending on the polarization of the incident field (Figure 2). The lumped capacitance $C$ can be calculated using the approximate expression in [5].


For each resonance frequency, the co-polarisation components and cross-polarisation components are shown in the figure 5 (a) and (b) for the E-Plane cut ($\phi = 45^o$) and the H-Plane cut ($\phi = -45^o$) and The 3D radiation patterns of the component ($G_\theta$) and component ($G_\phi$) are plotted in figure 5 (c) and (d) respectively.