

# MODELISATION ELECTROMAGNETIQUE DES MATERIAUX COMPOSITES EN COUCHES MINCES. APPLICATION A LA CONCEPTION DES ANTENNES MINIATURES EN HYPERFREQUENCES.

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**Abstract:** The purpose of this work is the electromagnetic modeling of thin-film materials for microwave applications; to improve performances and reduce dimensions. Our work is devoted to exploiting the characteristics of the materials studied for the miniaturization of multi band antennas work in several microwave ranges. Furthermore, the high-permittivity of ferroelectric thin-film materials are used to design miniatures antennas, which gives us a reduction about 67% in size .Thus; we have designed as well as tunable antenna in the region of 57 MHz. Another antenna is designed with the metamaterial cell engraved on the ground plane, whose choice of CSRR dimensions and its position are optimized by the particle swarm method. As a result, we obtained the miniature antenna with a reduction of 81% that operates in two frequencies 2.45 GHz and 5 GHz.

**Keywords :** Modélisation électromagnétique, composites, couches minces, Antennes, métamatériaux