Design of a Vivaldi Antenna for Ground Station Defence Application

Abstract:

This paper introduces an innovative and carefully optimized Vivaldi antenna specifically designed for defence applications, utilizing a Genetic algorithm. The proposed antenna operates effectively within the frequency range of 380 MHz to 520 MHz and is constructed using FR4 dielectric medium. With strict limitations on physical dimensions, the antenna is confined to a size of 160 mm x 160 mm x 1 mm. To achieve the desired Voltage Standing Wave Ratio (VSWR), a Genetic algorithm is employed, employing a random search method to optimize the performance parameters of the antenna design. Once the VSWR requirement of less than 3 is successfully met, a detailed parametric analysis will be carried out to evaluate the antenna's gain and radiation patterns. The resulting antenna design demonstrates remarkable performance improvements within the designated frequency range of 380 MHz to 520 MHz.

Keywords: Vivaldi antenna, Ultra-High Frequency, Defence applications, genetic algorithm, VSWR, gain, radiation patterns.