

A Dual Polarized Millimetre Wave Antenna for 5G Wireless Communication Systems Using Genetic Algorithm

Abstract:

This paper presents the innovative design and meticulous optimization of a dual-polarization millimetre-wave antenna tailored specifically for wireless communication networks. The transmitter antenna operates with horizontal polarization, while the receiver antenna functions with vertical polarization, both effectively sharing a common electrical ground. To attain the desired Voltage Standing Wave Ratio (VSWR), a sophisticated genetic algorithm is employed to fine-tune the antenna design performance parameter using rank-based selection method. Once the VSWR requirement is successfully met, comprehensive investigations are conducted to evaluate the antenna's gain and radiation patterns. The resulting antenna design showcases exceptional performance enhancements within the frequency range of 26 GHz to 28 GHz for the transmitter and 21.50 GHz to 22.50 GHz for the receiver.

Keywords: Dual-polarization antenna, millimetre-wave, wireless communication networks, genetic algorithm, VSWR, gain, radiation patterns.