GA-based Bandwidth Enhancement of Wideband Printed Monopole Antenna through Control Points Position of Spline Curve on Its Groundplane

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Abstract — This paper deals with the bandwidth enhancement of a wideband printed monopole antenna based on genetic algorithm (GA). The antenna is designed on an RT/duroid® 5880 dielectric substrate whereby the groundplane is configured by a spline curve based on a quadratic Bézier formula from a constellation of 13 symmetrical control points as the partial boundaries. Here, the GA optimization is used to determine the position of seven control points. The characterizations show that the initial configuration has the bandwidth response from the frequency of 3.08 GHz to more than 20 GHz, while the GA optimized one produces the bandwidth from the frequency of 2.86 GHz to more than 20 GHz. The decrease on the lower frequency yields an increase on the bandwidth ratio from 6.49 : 1 to 6.99 : 1. Thus, the proposed configuration produces the bandwidth enhancement from 215.6% to 226.6%. Moreover, the measurements have validated the proposed configuration, in which the realized antenna works from the frequency of 3.47 GHz to 20 GHz or the geometrical bandwidth of 198.4%, and the bandwidth ratio of 5.76 : 1.