

Novel Method of UWB Antenna Optimization for Specified Input Signal Forms by Means of Genetic Algorithm

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Abstract—A novel optimization procedure for the design of antennas for ultrawideband (UWB) wireless communication systems is presented. The optimization is based on the time-domain characteristics of the antenna. The optimization procedure was applied to a simplified version of the volcano smoke antenna proposed by Kraus. However, any other type of UWB antenna can be treated with the same technique. Our optimization procedure aims at finding an antenna not only with low VSWR but also a low-dispersion one which will ensure high correlation between the time-domain transmitting antenna input signal and the receiving antenna output signal. In pulse communications systems, usually an input signal form suited to a particular purpose is used. Hence, we strive to design the best antenna for a given input signal form. The optimization technique adopted here makes use of genetic algorithm (GA) search concepts. The electromagnetic analysis of the antenna is done by means of a finite-difference time-domain method using the commercially available CST Microwave Studio software.

Index Terms—Correlation (fidelity), dispersion, genetic algorithms (GAs), indoor communication, monopole antenna, time-domain analysis, ultrawideband (UWB) antennas, ultrawideband communication.

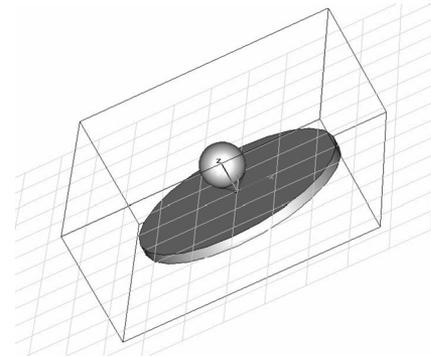


Fig. 1. Simplified volcano smoke prototype antenna.

