

Genetic Algorithms with PDSS and Adaptive Parameters for Phased Array Synthesis

Sunday Ekpo¹, Edidiong-Obong Ekpo², and Armstrong Sunday³

¹Don Manuel & Associates (Consulting Engineers), Nigeria

²Don Manuel & Associates (Consulting Engineers), Nigeria

³Don Manuel & Associates (Consulting Engineers), Nigeria

Abstract

Genetic algorithms (GAs) are search methods based on the principles and concepts of natural selection and evolution. They are commonly used to solve many optimisation and synthesis problems. An important issue facing the user is the selection of genetic algorithm parameters, such as selection strategy, mutation rate, mutation range, and number of crossovers. This paper demonstrates population decimation selection strategy (PDSS) that ensures proper convergence with adaptive parameters during the optimisation process, which is shown to outperform its best counterpart when used to synthesise phased array weights to satisfy a specified far field sidelobe envelope. When compared to other selection strategies implementations, the algorithm converges faster with the best solutions resulting in a great reduction of computation time.