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Optimization of Patch Antennas via Multithreaded Simulated Annealing based Design Exploration

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Abstract

In this paper, we present a new software framework for the optimization of the design of microstrip patch antennas. The proposed simulation and optimization framework implements a simulated annealing algorithm to perform design space exploration in order to identify the optimal patch antenna design. During each iteration of the optimization loop, we employ the popular MEEP simulation tool to evaluate explored design solutions. To speed up the design space exploration, the software framework is developed to run multiple MEEP simulations concurrently. This is achieved using multithreading to implement a manager-workers execution strategy. The number of worker threads is the same as the number of cores of the computer that is utilized. Thus, the computational runtime of the proposed software framework enables effective design space exploration. Simulations demonstrate the effectiveness of the proposed software framework.

Keywords: microstrip patch antennas, FDTD, design space exploration, simulated annealing, multithreaded parallelization

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