Optimization in optical systems revisited: Beyond genetic algorithms\textsuperscript{1} DENIS GAGNON, JOEY DUMONT, LOUIS J. DUBÉ, Universite Laval, Quebec (Canada) — Designing integrated photonic devices such as waveguides, beam-splitters and beam-shapers often requires optimization of a cost function over a large solution space [1]. Metaheuristics — algorithms based on empirical rules for exploring the solution space — are specifically tailored to those problems. One of the most widely used metaheuristics is the standard genetic algorithm (SGA), based on the evolution of a population of candidate solutions. However, the stochastic nature of the SGA sometimes prevents access to the optimal solution. Our goal is to show that a parallel tabu search (PTS) algorithm is more suited to optimization problems in general, and to photonics in particular. PTS is based on several search processes using a pool of diversified initial solutions. To assess the performance of both algorithms (SGA and PTS), we consider an integrated photonics design problem, the generation of arbitrary beam profiles using a two-dimensional waveguide-based dielectric structure [2].


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