



*algorithms*



*Special Issue Reprint*

## **Metaheuristic Algorithms in Optimal Design of Engineering Problems**

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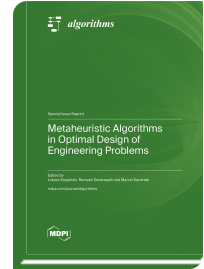
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Metaheuristic algorithms are advanced optimization methods widely used to solve complex engineering design problems. They operate by iteratively searching the solution space, employing strategies inspired by natural or physical processes to balance exploration and exploitation. Common examples include genetic algorithms, particle swarm optimization, simulated annealing, and ant colony optimization. These algorithms are effective for large-scale, nonlinear, and non-convex problems, making them valuable in fields such as mechanical, civil, electrical, and aerospace engineering. Metaheuristics can efficiently find near-optimal solutions where traditional methods may fail or become computationally expensive. Their performance depends on factors like initial solution quality, algorithm selection, and parameter tuning. By integrating metaheuristics with domain-specific knowledge, engineers can optimize system designs to meet performance, cost, and operational constraints. As research progresses, metaheuristic algorithms continue to expand their applicability and effectiveness in solving real-world engineering challenges.



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