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# PERFORMANCE ASSESSMENT OF METAHEURISTIC ALGORITHMS FOR STRUCTURAL OPTIMIZATION TAKING INTO ACCOUNT THE INFLUENCE OF CONTROL PARAMETERS

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**Abstract:** Metaheuristic optimization algorithms are characterized by stochastic behavior, making each optimization run unique. In addition, metaheuristic algorithms are usually governed by a number of control parameters that require problem-specific tuning. Many publications on metaheuristic algorithms lack the kind of rigorous statistical convergence assessment that is needed to compensate for the above uncertainties, making it impossible to assess the optimality of the resulting design or the effectiveness of the optimization method. In this contribution, we propose a method to assess the performance (i.e. the ability to find the best known solution and the associated computational cost) of a metaheuristic algorithm that takes into account the influence of its control parameters. First, a large number of simulations (independent optimization runs) are performed, where the values of the control parameters are randomly selected from predefined sets of realistic possibilities. Next, for every value of every control parameter, the corresponding subset of simulations is considered in order to infer the relevant conditional performance statistics. As a example, the approach is used to assess the performance of the genetic algorithm built into matlab for a 25-bar truss test case. It is observed that, for the algorithm and the test case considered, the majority of the control parameters have little influence on algorithm performance.