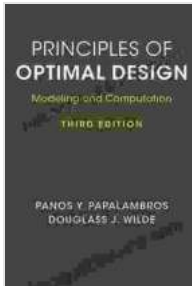


Principles of Optimal Design Modeling and Computation



Principles of Optimal Design: Modeling and Computation by Panos Y. Papalambros

★★★★★ 5 out of 5

Language : English
File size : 34556 KB
Text-to-Speech : Enabled
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Enhanced typesetting : Enabled
Print length : 507 pages



Optimal design is a branch of engineering that deals with the design of systems that are optimal with respect to some set of criteria. Optimal design problems can be found in a wide variety of applications, including aerospace, automotive, and manufacturing.

Optimal design modeling and computation is the process of developing and solving mathematical models of optimal design problems. These models are typically used to determine the values of the design variables that will result in the optimal design.

Formulation of Optimal Design Problems

The first step in solving an optimal design problem is to formulate the problem mathematically. This involves defining the design variables, the constraints, and the objective function.

The design variables are the variables that can be controlled by the designer. These variables can include things like the dimensions of the system, the materials used, and the manufacturing processes.

The constraints are the limitations that must be satisfied by the design. These constraints can include things like the maximum stress that the system can withstand, the minimum weight of the system, and the maximum cost of the system.

The objective function is the function that measures the performance of the system. This function can include things like the efficiency of the system, the reliability of the system, and the cost of the system.

Selection of Design Variables

The next step in solving an optimal design problem is to select the design variables. The design variables should be chosen so that they have a significant impact on the performance of the system.

In some cases, it may be necessary to use a large number of design variables. However, this can make the problem more difficult to solve. It is therefore important to choose the design variables carefully.

Development of Constraints

The next step in solving an optimal design problem is to develop the constraints. The constraints should be developed so that they accurately represent the limitations of the system.

In some cases, it may be necessary to use a large number of constraints. However, this can make the problem more difficult to solve. It is therefore

important to develop the constraints carefully.

Choice of Objective Functions

The next step in solving an optimal design problem is to choose the objective function. The objective function should be chosen so that it accurately measures the performance of the system.

In some cases, it may be necessary to use a multiple objective function. This is a function that takes into account multiple performance criteria.

Use of Numerical Optimization Methods

The final step in solving an optimal design problem is to use numerical optimization methods to find the values of the design variables that will result in the optimal design.

There are a variety of numerical optimization methods available. The choice of method will depend on the size and complexity of the problem.

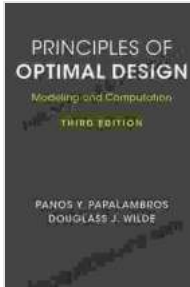
Optimal design modeling and computation is a powerful tool that can be used to design systems that are optimal with respect to some set of criteria. Optimal design problems can be found in a wide variety of applications, including aerospace, automotive, and manufacturing.

By following the principles outlined in this article, you can develop and solve optimal design problems effectively.

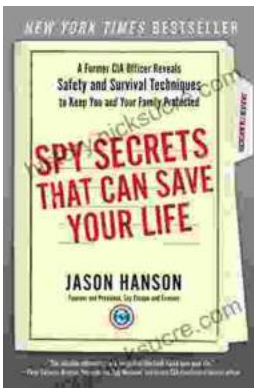
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