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Optimization of the mechanical structure of the distribution box

Overview

This paper presents two optimized designs of a commonly-used fluid distribution manifold having one entrance and six exits. Gantries and beams, as the main load-bearing structures of heavy equipment, usually belong to the box structure consisting of outer walls and inner stiffened plates. The structure of the stiffener layout is bulky due to empirical design, leading to higher material consumption and impacting. This paper proposed a topology optimization method by an adaptive growth algorithm for the stiffener layout design of box type load-bearing components under thermo-mechanical coupling. First, the adaptive growth. Optimization in structural mechanics plays a critical role in the design of lightweight, cost-efficient, and crash-resistant structures. In particular, this has become a key strategy for contemporary engineering challenges that involve the minimal use of materials with very stringent performance.

Article Content

Simultaneous optimization of stiffener layout of 3D box structure ...

This paper presents a novel and effective design method to improve the structural dynamic performance of 3D box structures subjected to harmonic excitations by combining the …

Topology Optimization of Stiffener Layout Design for Box Type Load ...

This paper proposed a topology optimization method by an adaptive growth algorithm for the stiffener layout design of box type load-bearing components under thermo-mechanical coupling.

Optimization of a Fluid Distribution Manifold: Mechanical Design ...

Numerical simulations were carried out to optimize the dimensions and mechanisms of these proposed designs for the sake of enhancing the uniformity of fluid distribution amongst the exits and reducing …

Layout Design of Stiffened Plates for Large-Scale Box Structure under ...

In this paper, a layout design method of stiffened plates for the large-scale box structures under moving loads based on multiworking-condition topology optimization is proposed.

Topology Optimization of Stiffener Layout Design for Box Type Load ...

An adaptive growth algorithm has become a more effective approach for structural topology optimization. This paper proposed a topology optimization method by an adaptive growth …

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MECHBench: A Set of Black-Box Optimization Benchmarks …

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Optimal layout of internal stiffeners for three-dimensional box ...

The adaptive growth method based on natural branching phenomena is applied to solve this layout optimization problem, in which techniques of ground structure construction, stiffener …

Optimization Method for Stiffened-Plate Layout in Box Structures

There are challenges in effectively identifying load-transferred paths within 3D box structures through direct topological optimization. A method for optimizing the layout of internal ...

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