

砂岩石材梁型结构的弯曲断裂的力学分析与参数设计

摘 要

伴随着社会的发展，我国现代工业的发展步伐越来越快，砂岩石材作为石雕艺术品的常用雕刻原石。

本文重点是为了快速完成砂岩石雕的粗雕过程，充分利用砂岩石材的脆性力学性质，将砂岩石材切成条形梁状，然后加力使其弯曲断裂破坏，实现快速粗雕加工。本文的目的是通过建立砂岩的悬臂梁力学模型，确定合理的边界条件，完成仿真程序设计，研究砂岩梁的几何参数、材料参数、不同的加载方式与砂岩梁的弯曲断裂破坏的规律，为石材数控设备的设计提供基本参数。因此，对其进行研究，具有重要的应用前景与工程使用价值和学术意义。通过砂岩石材的力学性质和力学参数进行实验研究，即对砂岩石材的力学参数进行处理，建立砂岩石材悬臂梁力学模型以及对其受力分析。然后利用 MATLAB 软件，编写仿真计算程序并进行调试、验证，并完成相应的仿真计算，对结果进行讨论、分析。最终了解花岗岩石材的力学性能，并为石材的加工提供理论指导。

关键词：砂岩，悬臂梁，MATLAB

ABSTRACT

With the development of society, China's modern industrial development pace is faster and faster, sandstone stone as a stone carving works of art commonly used to carve the original stone.

The key point of this paper is to quickly complete the rough carving process of sandstone stone, make full use of the brittle mechanical properties of sandstone stone, cut the sandstone stone into the shape of strip beam, and then add force to make its bending fracture failure, realize the fast rough carving processing. The purpose of this paper is to establish the mechanical model of the cantilever beam of sandstone, determine the reasonable boundary conditions, complete the simulation program design, study the geometric parameters of sandstone beam, material parameters, different loading methods and the bending fracture failure law of sandstone beam, and provide basic parameters for the design of CNC equipment for stone. Therefore, the research on it has important application prospect, engineering application value and academic significance. Through the mechanical properties and mechanical parameters of sandstone stone, that is, the mechanical parameters of sandstone stone are processed, the mechanical model of the cantilever beam of sandstone stone and its stress analysis are established. Then, MATLAB software was used to write the simulation program, debug and verify it, and complete the corresponding simulation calculation. The results were discussed and analyzed. Finally understand the mechanical properties of granite stone and provide theoretical guidance for stone processing.

Key words: sandstone, cantilever beam, MATLAB

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