

## 粗糙表面分形维数估算的改进立方体覆盖法

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**摘要** 岩石断面表面形貌的定量描述是评价其力学行为的基础。在粗糙表面分形维数估算的立方体覆盖法基础上, 提出了估算粗糙表面分形维数的改进立方体覆盖法。进一步根据粗糙表面形貌的有关数据, 采用立方体覆盖法和改进的立方体覆盖法分别对同一粗糙表面估算其分形维数值, 并进行了对比分析, 发现改进的立方体覆盖法不仅具有直接覆盖法的优点, 其估算过程也更加直观和方便。

**关键词** [岩石力学](#); [粗糙表面](#); [分形维数](#); [立方体覆盖法](#); [改进的立方体覆盖法](#)

分类号

## IMPROVED CUBIC COVERING METHOD FOR FRACTAL DIMENSIONS OF A FRACTURE SURFACE OF ROCK

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### Abstract

Description of fracture surface of rock is the base of evaluating its mechanical behavior. Ways to determine the fractal dimensions of a fracture surface are essential for a better understanding of its complete topographic characteristics. Triangular prism surface area method, projective covering method and cubic covering method are three widely used methods at present. Both the triangular prism surface area and projective covering methods cannot avoid the problem of approximate estimation of the real area surrounded by four points on the fracture surface, because the four points considered seldom lie on a plane. Such approximate calculations will certainly result in error. However, the cubic covering method can assure that every step is accurate. Therefore, it can be regarded as a reliable method for direct determination of the fractal dimension of a fracture surface. In this paper, a laser profilometer is employed to measure the topography of a rock fracture surface. Based on cubic covering method for the fractal dimensions of a fracture surface of rock, a new method named improved cubic covering method is proposed. Cubic covering method and improved cubic covering method are applied to computing fractal dimensions of the same fracture

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surface of rock. The results show that the improved cubic covering method not only has the advantage of the cubic covering method, but also has more convenient computing process.

**Key words** [rock mechanics](#); [fracture surface](#); [fractal dimension](#); [cubic covering method](#); [improved cubic covering method](#)

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