

Observation of Dimension Structure and Measurement of Fractal Dimension

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Abstract

It was found that fractal structures have a fractal dimension, which varies depending on the structure and material characteristics. We successfully generated and observed metallic trees and calculated fractal dimensions from them. We couldn't confirm the relationship between fractal dimensions and fractal structures.

1 Introduction

The world around us is full of all kinds of shapes. We did our research specifically on fractal shapes in metallic trees. Our goal was to find useful fractal structures for our lives.

2 Theory and Experiment

2cm×2cm Copper, Aluminum, and Iron plates, some of which were shaved and some which were unshaved, were prepared, and put into petri dishes with 10mL of silver nitrate solution of different concentrations.

3 Results and Discussion

0.05mol/L silver nitrate solution produced the most easily observable metallic trees. Copper and silver nitrate solution was the only combination that produced metallic trees with tertiary branches. Each structure was different, and when it was three-dimensional, it was impossible to observe. It was hard to observe on filter paper because of paper fibers.

4 Conclusion

To reduce the interference with the growth of metal trees, we will conduct experiments using objects with a smooth surface. We need to collect more experimental data, measuring the number of dimensions and examining the characteristics of fractal shapes. Investigate the relationship between fractal shapes and fractal dimensions that can be utilized for yogurt lids and ship bottoms for water repellency.

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6 Key words

Fractal, Fractal dimension, silver nitrate, metallic trees, structure