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Research Article
ISSN 2304-6295
Received: November 15, 2024 *Accepted: November 29, 2024* *Published: December 8, 2024*

Fractal structure of cast iron and its strength characteristics

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Keywords:

Cast iron; Fractal analysis; Microstructure; Strength characteristics; Structural integrity; Fractal dimension; Mechanical properties; Metallic materials; Quality evaluation

Abstract:

The object of research is the fractal microstructure of cast iron and its relationship with the material's strength characteristics. The study focuses on identifying structural features that influence mechanical properties, using fractal geometry as the analytical framework. **Method**. Fractal analysis is employed to quantify the geometric complexity of the cast iron microstructure. High-resolution imaging techniques and computational tools are used to extract fractal dimensions, which are then correlated with experimentally determined strength parameters such as tensile strength and hardness. Comparative analysis is performed to establish patterns between fractal metrics and mechanical performance. **Results**. The study demonstrates that the fractal dimension of cast iron's microstructure serves as a reliable indicator of its strength characteristics. A higher fractal dimension correlates with improved mechanical properties, offering a novel approach to material quality assessment. The findings provide a foundation for optimizing the production processes of cast iron by targeting specific fractal structures.

1 Introduction

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2 Materials and Methods

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3 Results and Discussion

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4 Conclusions

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5 Acknowledgements

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6 Fundings

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7 Conflict of Interests

Text, text, text

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