

THE BEHAVIOR DESCRIPTION OF CUZnAl SHAPE MEMORY ALLOYS THROUGH THE DYNAMICS OF MULTIFRACTAL COMPLEX SYSTEMS

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Abstract

CuZnAl alloys indicates a complex behavior due to reversible martensitic phase transitions, which provide materials which contains an unique property such as the shape memory effect. The dynamic movements of complex systems highlight some nonlinear structural transformations influenced by temperature, mechanical stresses, and the history of applied loads. Analyzing the behavior of CuZnAl alloys through the dynamics of multifractal complex systems leads to a detailed description of how the material's microstructure evolves.

By using a multifractal theory, the distribution of crystalline defects and martensitic domains can be described more precisely than with classical methods. The presence of self-similarity at the structural level of the alloy across multiple scales is characterized through a spectrum of multifractal exponents.

The dynamics of complex systems applied to CuZnAl alloys provide how external parameters, such as temperature and applied forces, influence the transitions between the austenitic and martensitic phases. These models help optimize technological processes to enhance the durability and reliability of these alloys in industrial and biomedical applications.

Integrating multifractal analysis into the study of CuZnAl alloys new possibilities for improving the performance of shape memory materials can be analized. In this regard, through the analysis of complex systems dynamics, the behavior of CuZnAl shape memory alloys can be described using modern research methods.

Keywords: CuZnAl alloys, shape memory effect, crystalline defects