A STUDY ON THE MODELING OF THE OPTIMAL CONFIGURATION OF FERROMAGNETIC MATERIALS

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Tóm tắt bằng tiếng Việt:

The most distinctive property of ferromagnetism is the observation of hysteresis loops. It is the feature expressing the fact that ferromagnetism can stay a nonzero magnetization after applying an external field and then removing it. Natural domain theory is one of physical mechanisms influencing the observed phenomenon. According this, “Ferromagnetic material is subdivided into regions, called magnetic domains”[1]. In each domain, the magnetic moments are aligned by molecular field, but the orientation of spontaneous magnetization can vary from domain to another domain. When the magnetization is averaged over volumes large enough to contain many domains, magnetization may close to zero. It turns out to be the minimalenergy state. This sounds reasonable to the thermodynamic balance principle. By using the finite element analyst method, we figured out the origin domain configuration of sustainable energy state of ferromagnetic material and the rearrangement to new structure under an external field.By using the finite element analyst method, we figured out the origin domain configuration of sustainable energy state of ferromagnetic material and the rearrangement to new structure under an external field.

Từ khóa: magnetic domain; domain wall; spin; closure domain; magnetostatic energy; spontaneous magnetization

Tóm tắt bằng tiếng Anh:

The most distinctive property of ferromagnetism is the observation of hysteresis loops. It is the feature showing the fact that ferromagnetism can remain as a nonzero magnetization after applying an external field and then removing it. The natural domain theory is about one of the physical mechanisms influencing the observed phenomenon. According to this, “Ferromagnetic material is subdivided into regions, called magnetic domains”[1]. In each domain, the magnetic moments are aligned via the molecular field, but the orientation of spontaneous magnetization can vary from domain to domain. When the magnetization is averaged over volumes large enough to contain many domains, magnetization may be close to zero. It turns out to be the minimalenergy state. This sounds reasonable to the thermodynamic balance principle. By using the finite element analyst method, we have figured out the origin domain configuration of the sustainable energy state of ferromagnetic material and the rearrangement to a new structure under an external field.

Key words: magnetic domain; domain wall; spin; closure domain; magnetostatic energy; spontaneous magnetization