

综述评论

功能铁磁材料的变形与断裂的研究进展

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摘要 综述了近几十年,特别是近十几年来铁磁材料的力磁耦合变形与断裂行为的研究概况.传统铁磁弹性问题的研究已经有较长时间的积累,文献中已有大量的研究结果发表.近些年来,随着智能材料及结构应用与研究的兴起,功能铁磁材料如稀土超磁致伸缩材料、铁磁相变材料以及铁磁复合材料等的力学行为越来越受到重视,人们在功能铁磁材料的变形与断裂以及铁磁复合材料的有效性质等方面开展了大量的研究工作.本文在简单介绍了经典铁磁弹性和传统铁磁结构的力磁性能的研究背景基础上,结合作者近年来在铁磁材料变形与断裂方面所开展的工作,着重评述了功能软铁磁材料在变形与断裂的实验研究,如实验设备和技术,以及铁磁复合材料细观力学、软铁磁材料、铁磁功能材料的变形与断裂理论等方面的研究进展,并指出了需要进一步研究的方向.

关键词 [力磁耦合,变形,断裂,复合材料,磁弹实验](#)

分类号

Deformation and fracture of the functionally ferromagnetic materials

Abstract

This paper reviews the research on deformation and fracture of the functionally ferromagnetic materials in the past several decades, especially in the recent decade or so. Problems of classical magnetoelasticity have been studied for a long time and a large number of papers results have been published. Along with the development of smart materials and structures in recent years, the functionally ferromagnetic materials, such as the giant magnetostrictive materials of rare earth, ferromagnetic shape memory alloys and the ferromagnetic composites, have attracted great attention. A lot of studies concern the deformation and fracture of the functionally ferromagnetic materials and the effective properties of ferromagnetic composites. In this paper, a brief introduction is firstly given to the research background of the classical magnetoelasticity and the mechanical and magnetic behavior of the traditional ferromagnetic structures. The research achievements on deformation and fracture behavior of the soft ferromagnetic materials and the mechanics of the ferromagnetic composites are presented and commented extensively. Also discussed are the authors' studies in recent years both on the experimental techniques of the functionally ferromagnetic materials, and the theoretical work on the mesomechanics of the ferromagnetic composites, the magnetomechanical deformation and fracture mechanics of the soft ferromagnetic materials and smart ferromagnetic shape memory materials. Finally, some topics for further studies are pointed out.

Key words [magnetomechanical](#) [deformation](#) [fracture](#) [composites](#) [magnetoelastic experiment](#).

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