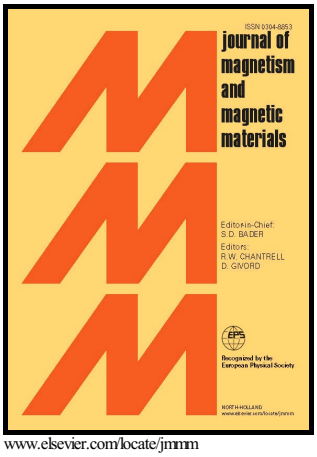

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Microstructural and magnetic properties of thin obliquely deposited films: a simulation approach

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Abstract

The relation between microstructural and magnetic properties of thin obliquely deposited films has been studied by means of numerical techniques. Using our developed simulation code based on ballistic deposition model and Fourier space approach, we have investigated dependences of magnetometric tensor components and magnetic anisotropy parameters on the deposition angle of the films. A modified Netzelmann approach has been employed to study structural and magnetic parameters of an isolated column in the samples with tilted columnar microstructure. Reliability and validity of used numerical methods is confirmed by a good agreement of the calculation results with each other, as well as with our experimental data obtained by the ferromagnetic resonance measurements of obliquely deposited thin $Ni_{80}Fe_{20}$ films. The combination of these numerical methods can be used to design a magnetic film with a desirable value of uniaxial magnetic anisotropy and to extract the obliquely deposited film structure from only magnetic measurements.

Key words: Fourier space approach; Magnetic anisotropy; Netzelmann approach; Oblique deposition; Thin film growth simulation

1. Introduction

Thin magnetic films with heterogeneous microstructure have gained much attention over the last decades. This interest is driven by the aim of a fundamental understanding of the thin films magnetism and their great potential applications in the fields of magnetic sensors, high-density data storage, and microwave devices. From practical point of view, it is of great