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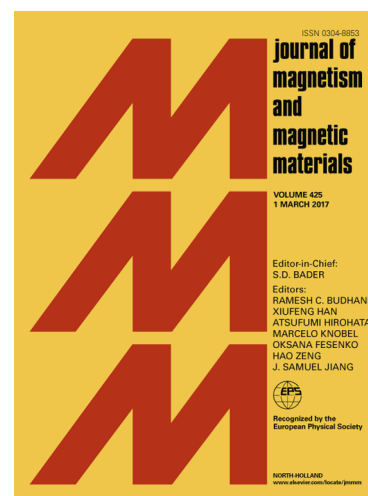
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Dynamic Magnetic Shape Memory Alloys Responses: Eddy Current Effect and Joule Heating

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Key Words: *MSMA, variant reorientation, dynamic responses, eddy current, Joule heating*

ABSTRACT

Generating high actuation frequency ($\sim 1.0kHz$) is one of the potential applications of Magnetic Shape Memory Alloys (MSMAs). In this work, dynamic responses of [single crystal](#) MSMAs [due to variant reorientation](#) are investigated. Time dependent part of the Maxwell equations becomes significant for a high frequency regime. Generation of an electric field and magnetic flux linkage due to the [motion of the material points during deformation](#) create a complex electro-magneto-mechanical coupling mechanism. We perform a thermodynamically consistent study to capture the variation of electromagnetic fields due to the deformation in the presence of fluctuating magnetic field, mainly focusing on eddy current and Joule heating. A comparison of MSMA responses with a typical ferromagnet/magnetostrictive material responses is discussed.

1 Introduction

MSMAs are best known for their unique ability to produce Magnetic Field Induced Strains (MFIS) up to 10% under a magnetic field [1–4]. Some of the commonly used MSMA material systems are NiMnGa [5–10], [FePd](#) [11–15]

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