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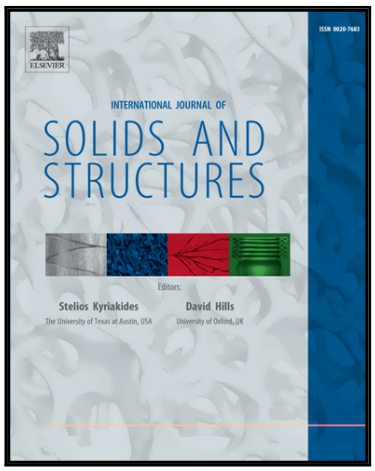

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Some aspects of macroscopic phenomenological material models for ferroelectroelastic ceramics

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Abstract

Macroscopic phenomenological constitutive models are used in order to describe the behavior of ferroelectroelastic materials. A representative example for such a model is the one proposed by Landis. During recent years, the authors of the present paper applied this model for practical problems. In this context, several problems occurred, which lead to failure of the computations. The purpose of the paper is to draw attention to these difficulties and to provide solution strategies where possible. Three different issues are discussed in detail. These include 1) the occurrence of indefinite linear moduli, 2) the occurrence of negative switching multipliers due to the particular choice of the functional form for the tensor of piezoelectricity, and 3) the occurrence of negative switching multipliers due to the particular choice of the functional form for the switching surface. Moreover, the paper is intended to serve as a motivation for further research.

Keywords: Constitutive laws, Piezoelectricity, Ferroelectroelasticity

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