Technische Universität Bergakademie Freiberg
Institute of mechanics and fluid dynamics
Chair of Applied Mechanics - Solid Mechanics

Documentation

Implementing User Element for Phase field simulations of polarization switching-induced toughening in ferroelectric ceramics

06. October 2019

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1 Introduction

For intro

2 Strong and Weak Formulation

2.1 Strong Form

An enthalpy equation for ferroelectric system is a function of polarization P_i, strain ε_{ij} and electric field E_i as given below

$$h(P_i, \varepsilon_{ij}, E_i) = \alpha_i P_i^2 + \alpha_{ij} P_i^2 P_j^2 + \alpha_{ijk} P_i^2 P_j^2 P_k^2 + \frac{1}{2} c_{ijkl} \varepsilon_{ij} \varepsilon_{kl} - q_{ijkl} \varepsilon_{ij} P_k P_l + \frac{1}{2} g_{ijkl} (\frac{\partial P_i}{\partial x_j}) * (\frac{\partial P_k}{\partial x_l}) - \frac{1}{2} k_0 E_i E_i - E_i P_i \quad (1)$$

(2)