

Static and Dynamic Analysis of Functionally Graded Piezoelectric Material Beam

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Berichte aus der Mechanik

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Preface

Functionally graded piezoelectric materials have received a lot of attention in recent days by their diversified and potential applications. In the present work the static bending and free vibration analysis of functionally graded piezoelectric material (FGPM) beam is investigated under electro-mechanical loading. The effective material properties are assumed to be graded according to sigmoid law through the thickness direction. Both two dimensional and three dimensional finite element analysis have been used. Here in solution for both multi-layered and monomorph models are presented and compared. COMSOL multiphysics (version 4.2) finite element software is used to obtain results. The accuracy of method is validated by comparing the results with previous studies. A convergence test is done with different mesh refinement. The effect of volume fraction index on tip deflection and fundamental frequencies is also evaluated. First three mode shapes are also presented for both two dimensional and three dimensional views.

Key words: *Functionally graded piezoelectric beam, Sigmoid law, Finite element analysis.*

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