Yasuhide Shindo et al., J Aeronaut Aerospace Eng 2014, 3:2
http://dx.doi.org/10.4172/2168-9792.S1.005

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Mechanical & Aerospace Engineering
September 08-10, 2014 Hilton Philadelphia Airport, USA

Electromechanical field concentrations near electrodes in PZT thick films under electric fields for MEMS mirrors

Yasuhide Shindo and **Fumio Narita**
Tohoku University, Japan

Optical MEMS devices such as micro-mirrors are used in applications such as scanned-beam imaging. Unimorph structures in MEMS mirror devices consist of one piezoelectric lead zirconate titanate (PZT) film and one elastic layer. In some piezoelectric unimorph structures, electromechanical field concentrations occur near an electrode tip, and the field concentrations can result in failure or polarization switching/dielectric breakdown of the PZT films. It is therefore important to understand the electromechanical field concentrations due to electrodes in PZT films. In this work, we discuss the nonlinear electromechanical response of piezoelectric mirrors driven by PZT thick films under DC [1]/AC [2] electric fields. The mirrors consisted of four fully or partially poled PZT unimorphs. A nonlinear finite element model incorporating the polarization switching/domain wall motion mechanism was used to predict the mirror tilt angle and electromechanical field concentrations ahead of electrodes in PZT thick films under DC/AC electric fields. The mirror tilt angle was then measured, and test results were presented to validate the predictions.

Biography

Yasuhide Shindo received his Doctor of Engineering from Tohoku University in 1977. He is currently a professor in the Department of Materials Processing in the Graduate School of Engineering at Tohoku University. He also served on the Board of Editors of International Journal of Solids and Structures, and is currently serving as the Editor-in-Chief of *Journal of Mechanics of Materials and Structures*, *The Open Mechanical Engineering Journal*, *The Advisory Board of Acta Mechanica*, etc.