Fabrication and modelling of the piezoelectric flexure actuators

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Abstract:
A piezoelectric flexure actuator is a bending element that generates displacement at the drive of electric field using the converse piezoelectric effect. Dual or multi stacked-element structure can be used for this device. When driven by an alternate power supply, it generates corresponding vibration amplitude and it can be used for the application of micro-displacement actuator.
In this study, bimorph (2 layers) are manufactured by the tape casting technique. Two procedures of fabrication are considered: the first method consists in sintering simultaneously the ceramic elements with an internal electrode. The second one is based on the bonding, with a glue, of sintered elements. These piezoceramic plates are arranged in the polarisation direction or are oppositely polarised. The aim of this work is to compare the performances of these actuators (resonance frequencies, displacement, strength) according to the conditions of manufacturing. In order to measure these characteristics both impedance analyser and laser interferometer techniques are used. The experimental results are correlated with finite elements calculations.