

Displacement Properties of Newly Developed 3-dimensional Piezoelectric Actuator at Various Ac Frequencies

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Abstract

The electromechanical displacement properties of the newly developed 3-dimensional piezoelectric actuator has been measured and analyzed at various AC frequencies. The actuator evaluated in this investigation is fabricated from powder injection molding method using $0.03\text{Pb}(\text{Sb}_{0.5}\text{Nb}_{0.5})\text{O}_3-0.03\text{Pb}(\text{Mn}_{1/3}\text{Nb}_{2/3})\text{O}_3-(0.94-x)\text{PbTiO}_3-x\text{PbZrO}_3$ composition. The 3-dimensional piezoelectric actuator is found to exhibit higher displacement properties than comparable multi layer piezoelectric actuators, which are considered to associate with geometrical factors. Finite element modeling was used to analyze the strains and vibration modes. This model yielded strains which were in good agreement with experimental data.