Actuator Structure Analysis Using New Electro-Thermo-Mechanical Finite Element for Functionally Graded Materials

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ABSTRACT

Functionally Graded Materials (FGMs) are new types of material where their properties vary spatially according to chosen function to reach such features that are unable to provide using standard materials or composites. Hence, a structure made of FGM can dispose for example with excellent thermal conductivity at one component part together with thermal insulating properties at another component part.

Proposed paper deals with electro-thermo-mechanical analysis of chosen actuator structure made od FGM using new finite element derived specially for this purpose. Rectangular cross-section of individual beams that form the von Mises structure with variation of material properties in longitudinal and lateral direction will be considered. Actuator action, electric voltage and temperature peak and also mechanical stress of the structure will be evaluated. Results from the analysis calculated using our new FGM beam finite elements will be compared to results from conventional FEM analysis where standard finite elements will be used.

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