

Dynamics Characterizations of Dielectric Electro- Active Polymer Pull Actuator for Vibration Control

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Abstract : Elastomeric dielectric material has recently become a new alternative for actuator technology. The characteristics of dielectric elastomers placed between two electrodes to withstand large strain when electrodes are charged has attracted the attention of many researcher to study this material for actuator technology. Thus, in the past few years Danfoss Ventures A/S has established their own dielectric electro-active polymer (DEAP), which was called PolyPower. The main objective of this work was to investigate the dynamic characteristics for vibration control of a PolyPower actuator folded in 'pull' configuration. A range of experiments was carried out on the folded actuator including passive (without electrical load) and active (with electrical load) testing. For both categories static and dynamic testing have been done to determine the behavior of folded DEAP actuator. Voltage-Strain experiments show that the DEAP folded actuator is a non-linear system. It is also shown that the voltage supplied has no effect on the natural frequency. Finally, varying AC voltage with different amplitude and frequency shows the parameters that influence the performance of DEAP folded actuator. As a result, the actuator performance dominated by the frequency dependence of the elastic response and was less influenced by dielectric properties.

Keywords : dielectric electro-active polymer, pull actuator, static, dynamic, electromechanical

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