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Authors:

Ahmed A. Ali

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Abstract

Stability analysis of any precision mechanical system is an important issue to be managed. In the present work two methods of active vibration control had been studied on Unmanned Aerial Vehicle's Wing, controllers P, PI and velocity feedback (VF) were tested to enhance the stability of tested wing. Many types of unmanned aerial vehicles are used in applications required high stability like video recording for meteorological or space research, so attenuation of wing's vibration will improve the performance of camera and will facilitate guiding of the vehicle. Numerical and experimental analysis was performed, where a scaled wing with controlling loop was integrated in FE solver ANSYS.15. In experimental work (piezoelectric PPA-1001 MIDE -USA, DAQ NI PCIE-6321 .USA and TREK2205 ampliefier.USA) were used with Labview2015 software to perform controlling action of scaled wing fabricated totally in Lab. Piezoelectric smart material was used in present work to satisfy controlling action. A comparison between numerical and experimental measurements shows high degree of agreement. Also results show that both methods add noticeable enhancement on wing stability but with different percentage. Where the best controlling performance was for VF controller where with activation it facilitates

control in guiding the vehicle's controlling loop more than 83% of wing's settling time was eliminated.

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Index Terms

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Keywords

Finite Element Analysis ; ANSYS; Piezoelectric; Unmanned Aerial Vehicle; wing; Labview..