Autonomous Flight Performance Improvement of Load-Carrying Unmanned Aerial Vehicles by Active Morphing

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Abstract : In this paper, it is aimed to improve autonomous flight performance of a load-carrying (payload: 3 kg and total: 6kg) unmanned aerial vehicle (UAV) through active wing and horizontal tail active morphing and also integrated autopilot system parameters (i.e. P, I, D gains) and UAV parameters (i.e. extension ratios of wing and horizontal tail during flight) design. For this purpose, a loadcarrying UAV (i.e. ZANKA-II) is manufactured in Erciyes University, College of Aviation, Model Aircraft Laboratory is benefited. Optimum values of UAV parameters and autopilot parameters are obtained using a stochastic optimization method. Using this approach autonomous flight performance of UAV is substantially improved and also in some adverse weather conditions an opportunity for safe flight is satisfied. Active morphing and integrated design approach gives confidence, high performance and easy-utility request of UAV users.
Keywords : unmanned aerial vehicles, morphing, autopilots, autonomous performance
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