# Journal of Systems and Control Engineering

# MULTICRITERIA ANALYSIS OF AN L1 ADAPTIVE FLIGHT CONTROL SYSTEM

Manuscript Draft

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| **Manuscript Number** | TBD |
| **Full Title** | Multicriteria Analysis of an L1 Adaptive Flight Control System |
| **Article Type** | Full/Regular paper |
| **Keywords** | L1 adaptive control, flying qualities, multi-criteria optimization, Pareto space, randomized algorithms. |
| **Abstract** | This paper presents an overview of the application of the Parameter Space Investigation method for the multi-criteria design optimization of the L1 adaptive flight control system implemented on the two turbine-powered dynamically-scaled GTM AirSTAR aircraft. In particular, the study addresses the improvement of a nominal *prototype* solution, obtained using basic design guidelines of L1 adaptive control theory. The results validate the theoretical claims of L1 adaptive control in terms of closed-loop performance and robustness, and illustrate the systematic character of its design procedure. Furthermore, the paper shows the suitability of the Parameter Space Investigation method for the multi-criteria design optimization over a multi-dimensional design variable space of a flight control system subject to desired control specifications. The use of this particular method is of special interest, as it provides invaluable information about the behavior of the closed-loop system in an extended space of design parameters and performance criteria. The results and conclusions of this paper have led to a deeper understanding of the characteristics of the closed-loop adaptive system, and have contributed to the improvement of the flying qualities and the robustness margins of the adaptive L1-augmented aircraft, which has been recently flight tested by NASA. |
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