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14. ABSTRACT
This paper presents the flight test results and lessons learned of a limited evaluation of a longitudinal model-free adaptive control law system, executed by USAF TPS Class 21B. The control law under test was designed to produce specified aircraft dynamics by measuring the aircraft response and adapting in real time. This control law was flown on the Calspan VSS Learjet allowing the control law to experience the dynamics of a wide variety of aircraft via the aircraft's inflight simulation capability. Additionally, the VSS learjet creates a safety sandbox which disengages the control law from the flight controls if undesirable motion is measured. The test was the first time the control law was flown on a manned aircraft. The limited evaluation utilized frequency sweeps to quantitatively measure the ability of the control law to produce the desired dynamics and accomplished multiple single-ship and formation handling qualities tasks to qualitatively evaluate the new control law. Overall, the control law demonstrated an ability to produce the specified short period dynamics with a wide variety of underlying dynamics. However, a large equivalent time delay was also observed which negatively impacted the fine tracking of the controller. This testing presents the unique challenge of model following controls in that the objective is not to evaluate what the flying and handling qualities are, but how closely they match the desired dynamics.

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