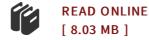# A Comparison of Nonlinear Algorithms to Prevent Pilot-Induced Oscillations Caused by Actuator Rate Limiting

By James G. Hanley

Biblioscholar Okt 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x7 mm. This item is printed on demand - Print on Demand Neuware - Actuator rate limiting has contributed to Pilot-Induced Oscillations (PIO) on almost every new fly-by-wire aircraft. Actuator rate limiting affected aircraft handling qualities in two ways: it exposed the aircraft's unaugmented flight dynamics and shifted the phase between the pilot input and actuator output. Phase shifting was the primary cause of PIO due to rate limiting. Two proposed solutions both placed a flight control system filter between the pilot command and actuator input. The first, referred to as Feedback-with- Bypass (FWB) and developed by Dr. Lars Rundqwist of SAAB Aircraft, used a low-pass filter to add phase lead to the pilot command. The second, referred to as Derivative- Switching (DS) and developed by Dr. Brad Liebst and Capt. Mike Chapa of AFIT, used the first and second derivatives of the pilot's command to reverse the actuator output in phase with the pilot input during actuator rate limiting. The objective of this study was to compare the ability of these two flight control system filters to prevent PIO during actuator rate limiting, and the filters' effects on aircraft handling qualities....

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