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Case Studies to Illustrate the Rotorcraft Certification by Simulation Process Cs 27/29 Dynamic Stability Requirements

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摘要:

Certification through simulation is becoming increasingly significant in the aviation industry as a means to reduce costs and enhance safety. This recognition is underscored by the guidance from EASA and FAA. The EU CleanSky2-funded Rotorcraft Certification through Simulation project has developed guidelines for utilizing physics-based flight simulation processes to demonstrate compliance with airworthiness regulations.

The preliminary guidelines advocate for a requirements-based approach, starting with the selection of applicable certification rules and assessments of predictability and credibility. Three case studies have been conducted, focusing on requirements such as X-Wind (controllability and manoeuvrability), CAT A Rejected Takeoff, and Dynamic Stability criteria. This presentation delves into the case study specifically addressing dynamic stability requirements, in collaboration with EASA and Leonardo Helicopter in Italy. It illustrates the guidelines, including a credibility analysis to extrapolate results to different flight conditions. New flight test manoeuvres are proposed to evaluate the impact of reduced dynamic stability levels on pilot workload in turbulence and gust. The piloted simulations, carried out on a 6DOF full-motion system, demonstrate the effectiveness of this Certification through Simulation approach. It offers a promising methodology to enhance efficiency and safety in rotorcraft, eVTOL, and fixed-wing aircraft certification.

简介:

Dr Linghai Lu is Associate Professor in Flight Dynamics, Simulation & Control at Cranfield University. He is currently PIs on one UK government funded project (ADEPT project, £20M), one EPSRC project (Rotorcraft Simulation Fidelity, EP/P030009/1), one CleanSky2 project (Rotorcraft Certification by Simulation, H2020-CS2-CFP08-2018-01), and Co-I on PINES Project funded by Rolls-Royce. He also was Co-I on the Clean Sky 2, E-PILOT, H2020-CS2- No 831993. He worked on a few EPSRC (2) and EU projects (2) as a post-doc researcher at the University of Liverpool. He has acquired considerable expertise in Rotorcraft High-Fidelity Modeling and Simulation, Pilot Modelling and Flight Handling Qualities, Aircraft/Rotorcraft System Identification, Nonlinear Robust Flight Control Design, and Real-time Simulation, eVTOL flight control and certification. Dr Lu is a Senior Member of AIAA.