Challenges in Tejas (LCA) Flight Control Design, Development and Testing

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Sunday, 26 Nov 2017 | 4pm – 5.30 pm |Training room, 100 NCL Innovation Park

Abstract:

Light Combat Aircraft (LCA) named as Tejas is a single engine, tail-less, delta wing, supersonic fighter aircraft which is designed to be aerodynamically unstable in its longitudinal axis. In order to stabilize the airframe and achieve the desired performance over the entire flight envelope it incorporates a quad redundant full authority fly-by-wire (FBW) flight control system (FCS). The control laws in addition to guaranteeing stability, optimize the aircraft performance and pilot handling qualities for various combinations of external store configurations. LCA has flown more than 4000 flights including trainer and naval variants. This talk narrates challenges in flight control law design, development and testing. At present LCA (Tejas) has been inducted into Indian Airforce.

Our speaker of the session: **Dr. Vijay V. Patel, Group Director (Flight Control Laws LCA-AF),Integrated Flight Control System, Aeronautical Development Agency, Ministry of Defence, DRDO, Bangalore 560017**

Dr Vijay Patel is currently Group Director (Flight Control Laws- LCA Airforce) and is member of the National Control Law Team since 1995. The National Control Law Team team was setup for the Light Combat Aircraft (LCA) by Dr. A. P. J. Abdul Kalam. Dr. Patel has been involved and also responsible for the design, development and testing of flight control system of LCA (later named as Tejas Aircraft in May 4, 2003 by Prime Minister Atal Bihari *Vajpaye*). His major contributions include the successful design and development of flight control algorithms, design of structural notch filters, verification of the flight control system performance in the iron bird and on aircraft and responsible for piloted handling qualities assessment at real time simulator and related detailed flight test data analysis. He was also responsible for estimation of aerodynamic coefficients from flight test data using nonlinear parameter estimation techniques which enabled flight validation of the aerodynamic data thereby allowing the aircraft to expand its flight envelope to lower speeds and higher angles of attack. He played a major role in developing boundary limiting features in flight control laws which in turn enabled to expand the flight envelope safely, more rapidly without compromising safety. Dr Patel is responsible for development of LCA flight control laws features for carefree maneuvering. Dr Patel has shared his flight control design, development and testing experience with other national projects such as ISRO's RLV, Auotopilot of HAL's *Advanced Light Helicopter* (*ALH*), ADE's various UAV project and played major role in the technical reviews related to control systems of these project.

Dr. Patel obtained his PhD in the area of robust control from IIT Kharagpur in 1995 and did his post doctoral research at Virginia Tech, USA (2006-2007) in the areas of L1 adaptive flight control, coordinated path following for unmanned aerial vehicles (UAVs) and adaptive flight control design for unmanned combat aerial vehicles (UCAVs). During post doctoral fellowship period in 2006-2007, Dr. Patel got an opportunity to work with NASA (Hampton, USA) and Boeing sponsored projects which were futuristic aircraft and its flight control design problems. Dr. Patel has published 80 technical papers in peer reviewed international journals and conferences. He has also solved three open problems in mathematical control literature. He is recipient of INSA "Young Scientist Award (2001)", INAE "Young Engineer Award (2004)", DRDO Scientist of the year (2013) Award" and other awards from ISCA, NAL, DRDO.

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