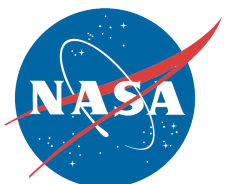


NASA Dryden Status

**Aerospace Control & Guidance Sub-committee
Salt Lake City, Utah
March 2008**

**Tim Cox
(661) 276-2126
Timothy.h.cox@nasa.gov**



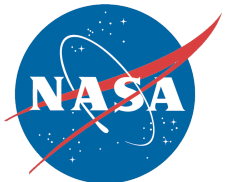
March 2008

Ikhana Project Update

- **Successful completion of Western States Fire Mission**
 - Ames, USFS
 - FEMA and California request support during Southern California wildfires
 - Positive feedback from fire commanders on benefit of near real time imageries
- **ARTS III research controller software/hardware ready for SIL integration**
 - GA perform SIL integration tests in mid-March 2008
 - Further research TBD



- **Dryden developed Fiber Optic Wing Shape Sensing ready for flight test pending final review**
 - Sensors and wiring installed
 - Ground test completed
 - Flight test is scheduled for mid-March 2008

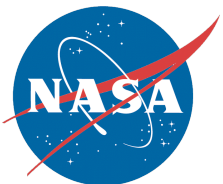
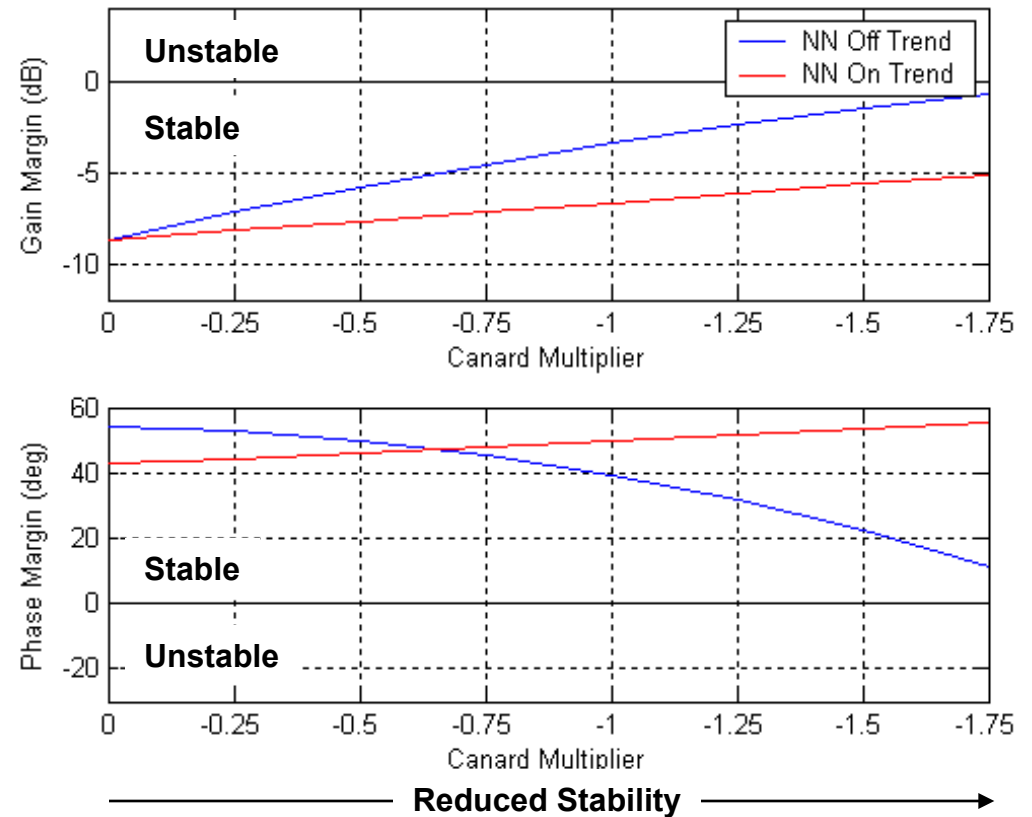


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F-15 Intelligent Flight Control System Status

- Flight tested adaptive control response to an unstable airframe
 - Destabilizing feedback of alpha to canards (canard multipliers)
 - The adaptive controller restored acceptable gain and phase margins
- Flight tested failed stabilator actuator: 0, 2, 4 deg from trim
 - Pilot opinions generally favorable
 - PIO case formation flight
- Investigating handling quality metrics for cross-coupling

Stability Margins Derived From Flight Data

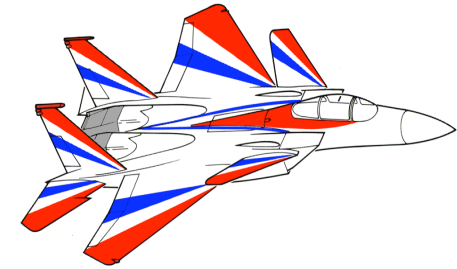


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Intelligent Flight Control System (IFCS), cont'd

- **Current Plans**

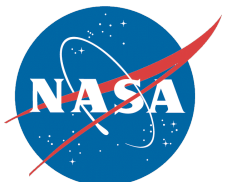
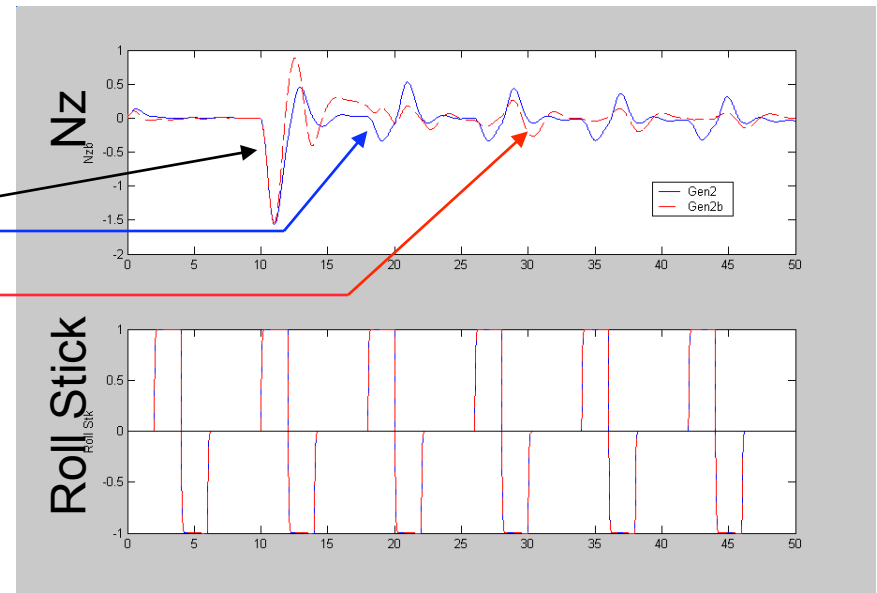
- Finish evaluations of canard multiplier
- Investigate cross-coupling metrics
- Improve adaptive controller to:
 - » Reduce transients (upon failure insertion)
 - » Improve tracking performance
 - » Reduce cross-coupling effects
- Flight test into summer 08
 - » Canard multiplier
 - » Jammed stabilator



Failure inserted Right Stab at 10 sec.

Current adaptive controller response

Re-designed adaptive controller response

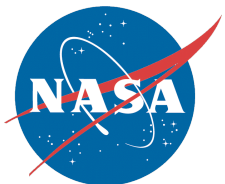
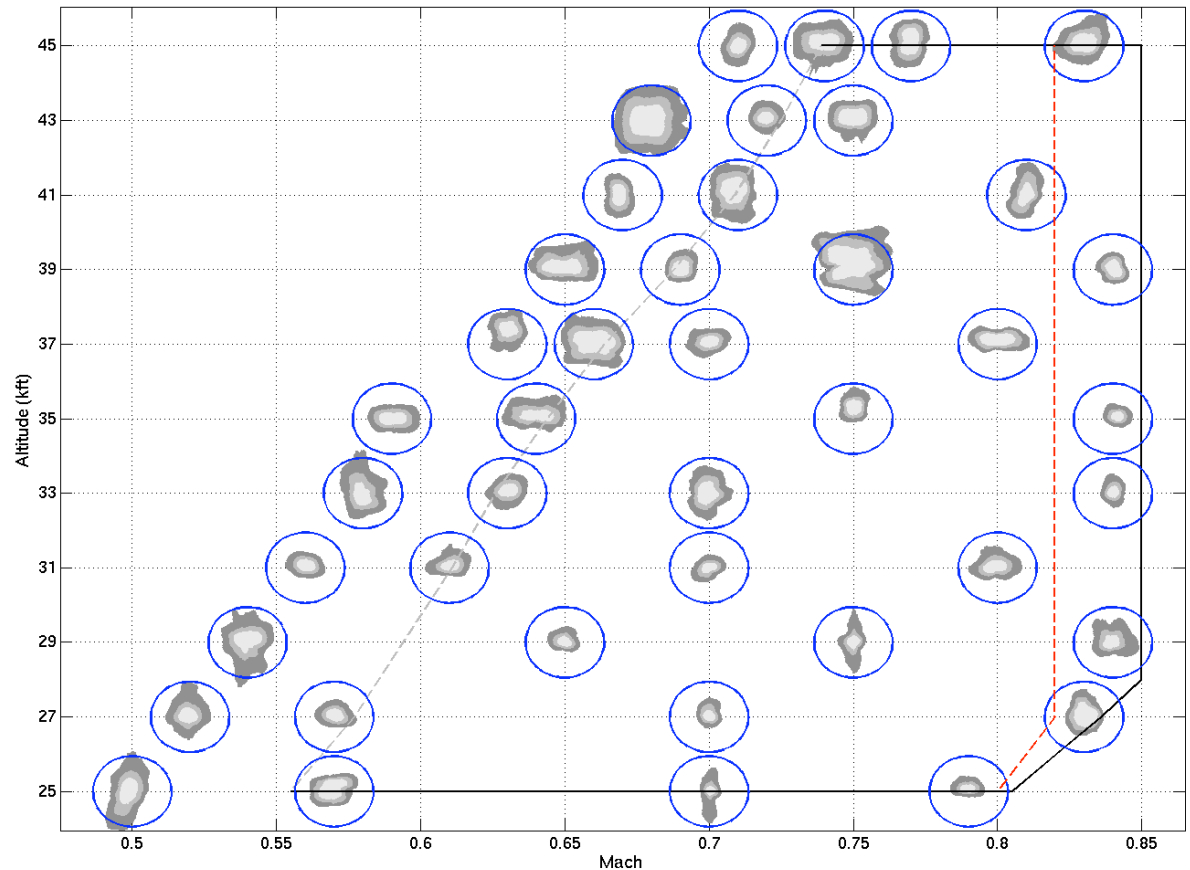
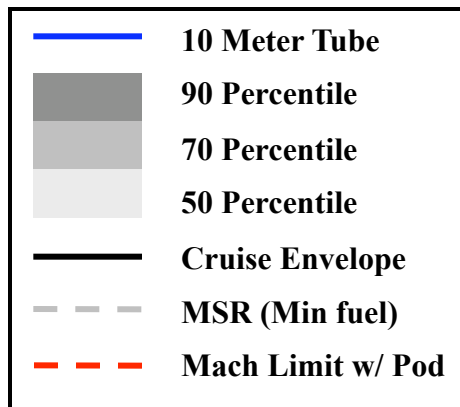


March 2008

C-20A Precision Autopilot Results

Unmanned Aerial Vehicle Synthetic Aperture Radar (UAVSAR)

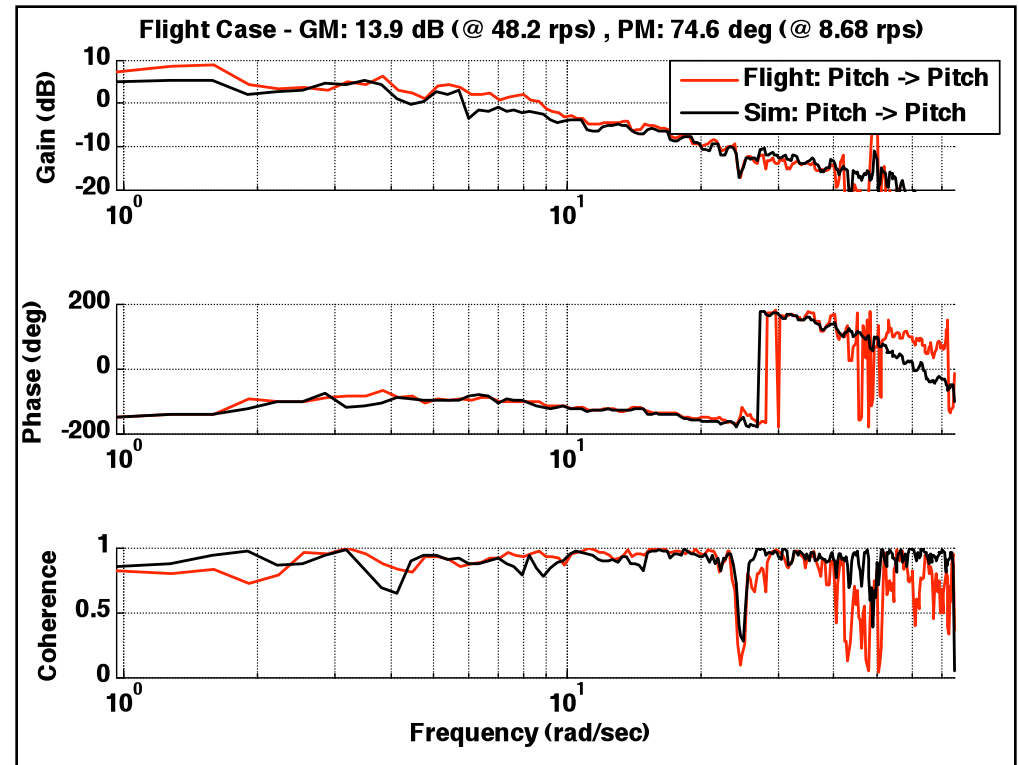
- Requirement: Fly within a 10 meter tube 90 percent of the time with calm to light atmospheric disturbances
- Flight envelope performance (see figure)



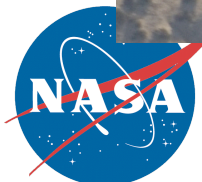
March 2008

X-48B Blended Wing Body

- 9 flights completed (as of Feb 22)
- Initial slats extended envelope has been cleared
 - Forward to Aft CG range
 - Wide airspeed range
- Accurate matches between simulation data and flight data



- Slats retracted envelope clearance begins in a few weeks
 - Higher speed
 - Less margin
- Potential testbed for intelligent flight control research



March 2008

SOFIA

- **Stratospheric Observatory for Infrared Astronomy**
 - 2.5 m infrared telescope
 - Door cavity
 - Platform is 747 SP
- **Closed door envelope clearance complete**
 - Structures emphasis
 - Flight dynamics relatively unaltered
 - Baseline established
- **Open door flights scheduled winter 09**
 - Envelope clearance
 - Early science requirement
 - Autopilot development to support science



March 2008

