Feedback on JAMS Review

Rick Young, Principal Investigator
Aircraft Aging and Durability Project
NASA Aviation Safety Program

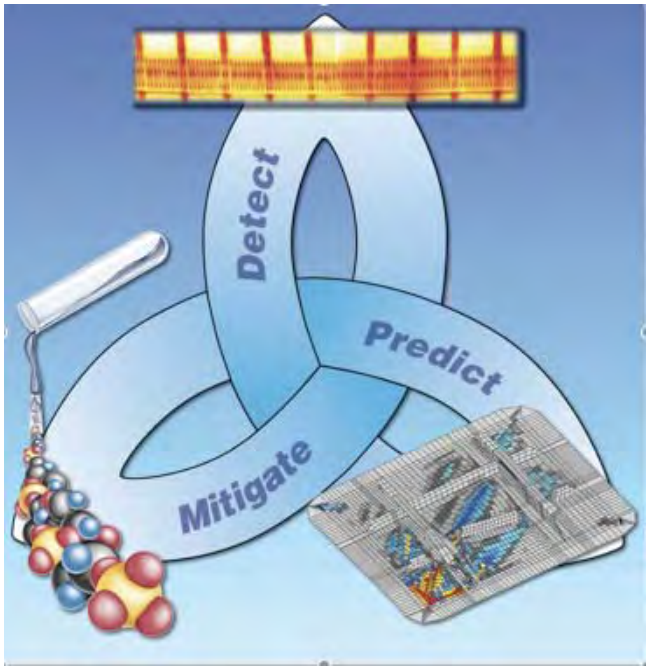
June 19, 2008

Aircraft Aging and Durability Project

Address aging and durability issues in emerging and next generation aero platforms:

- Metallic and Composite materials
- Ground-based inspection (Complemented by IVHM project)
- Aging and Damage Science; Life and Strength
- Design of materials and structures for durability

Project Themes



Project Challenge Problems

Metallic Airframe Structures	Composite Fuselage Structure	Engine Superalloy Disks	Engine Fan Containment Structure
Integral Metallic Structure	Bonded Joints	Engine Hot Section	Wiring Systems

Overall Impression of JAMS Review

- **Quality of presentations / speakers was high**
- **Broad comprehesive topical coverage**
  - **Several technical topics of mutual interest to NASA**
- **Presentations of diverse topics comes across as discrete research efforts**
  - **Encourage PI's to collaborate with each other to leverage (team effort)**
- **FAA leadership and Industry collaboration ensures relevance and engineering value**
- **More time allowed for group questions/discussion: presenters to allow at least 5 minutes**

Comments

- Limited budget / experience: makes sense to start with simplified problem, but remain systematic in approach
  - Anticipate response
  - Design experiments to isolate/understand response
  - Instrument for loads and deformation; not just strength or damage
  - Go beyond presenting results to explain why results are as presented
    - CT Sun: analysis to explain observed experimental results falsely attributed to other factors

- Validation of deterministic models
  - Validation is limited and often empirical
    - May not validate details
    - May not extend to next application
  - Separation between development/tuning and validation not always clear
  - Concerned when models do not represent deformations (crushing, delaminations) observed in experiment.

- Probabilistic Methods
  - Depend on reliability of deterministic models
  - Be careful not to over-estimate confidence with so many parameters

Comments (cont.)

- 737 horizontal teardown
  - Good news for aging concerns in composites
  - Curious to effect of aging on fracture: DCB and open hole tension/compression response, compression after impact (data on chart from Al Miller's presentation)
- Next generation FML: higher stiffness fibers may not use aluminum efficiently
- SHM: commend approach with interaction between SHM sensors and traditional NDI methods
- Damage and Aeroelastic response: flutter models represent stiffness change, but question whether aero model accounts for local flow change at damage; interested in local panel flutter that may propagate damage