Damage Tolerance / Aeroelastic Instability Session Breakout Report

Aeroelastic Instability

- More realistic cases
  – a representative Vertical Tail-Rudder FEM

- Development of critical damage scenarios

- Experiments (LCO)
  - ✓ 2D Duke (LCO)
  - ✓ 2D UW (LCO & Damage)
  - 3D low-speed test (LCO)

Damage Tolerance / Aeroelastic Instability

- Move methods/processes to COTS for general use, e.g., NASTRAN, Sol.400, etc. (nonlinear structural dynamics in Aeroelasticity)

- Probabilistic analysis → Determine value of probabilistic analysis relative to the current approach

Damage Tolerance

- A realistic design application
  - A representative Vertical Tail / Rudder, consistent with the aeroelastic instability study

Damage Tolerance / Aeroelastic Instability

- Technology/method needs in preparing inputs (or as algorithm modules) to the simulation code
  - Efficient residual strength analysis for given damages
  - Material degradation due to environments and aging
  - Environments uncertainties and effects
  - Damage/energy conversion or damage mapping between dissimilar structures
  - Damage propagation
  - MSG-3 (ATA Maintenance Steering Committee) conformity

- **Future developments**
  - Reliability-based design and certification for primary bonded structures
  - Probabilistic design for hail and bird strike
  - Reliability-based design for multifunctional structure
    - EME protection service/repair