

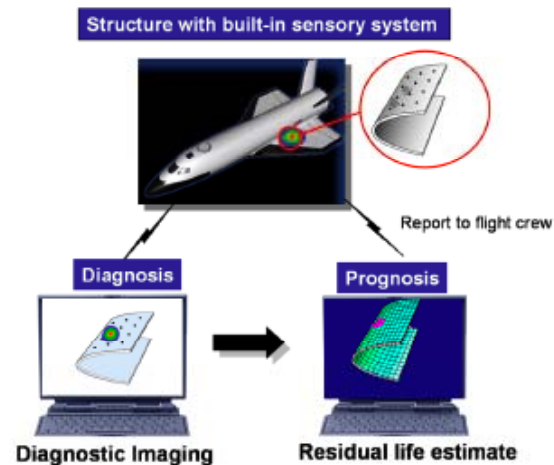
A Robust Health Management System for Composite Airframe Structures. Prognostics

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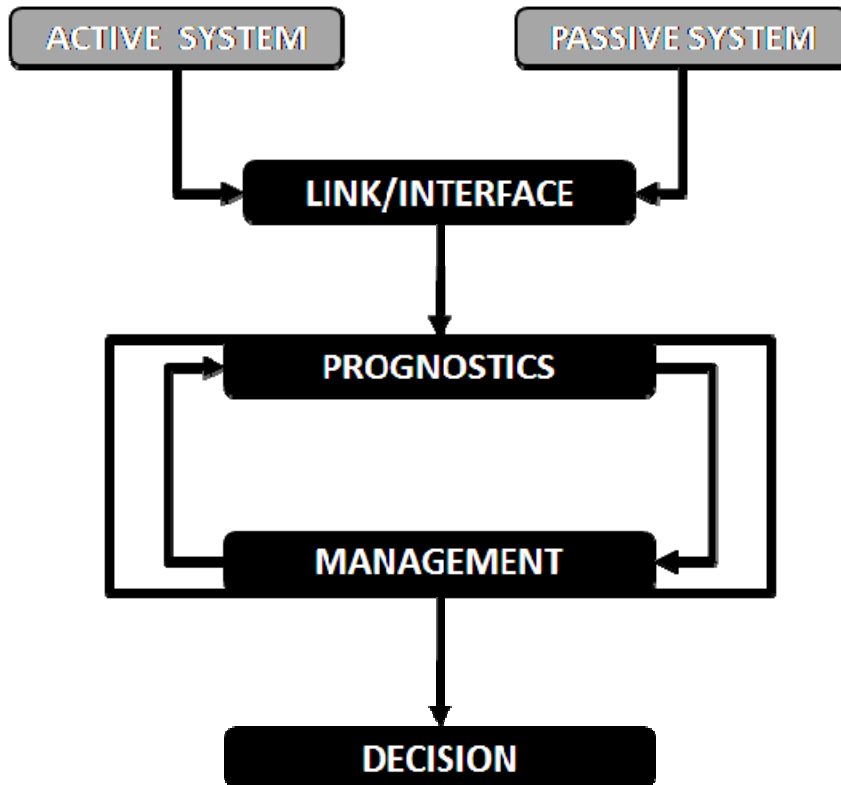
Motivation

Development of a consolidated health management system will result in:

- **Low cost maintenance:** inspection and maintenance schedules will be more efficient, cutting off unnecessary inspection costs
- **Damage Tolerance:** the structure's damage tolerance is evaluated at each major event, not only at the design stage.
- **Safety:** a more accurate life prediction and damage propagation that will help make better decisions.



Statement of Work



LINK/INTERFACE

Develop an interface that links diagnostic data into the prognostics simulation

Damage characterization

Translation to progressive FEA

PROGNOSTICS

Given a load, calculate structural strength by estimating damage propagation thru FEA

Static Loading

Fatigue loading

Impact loading

MANAGEMENT

Iterate thru future loads, estimating damage using some statistical simulation

Damage characteristics

Statistical model

Current Work

PROGNOSTICS

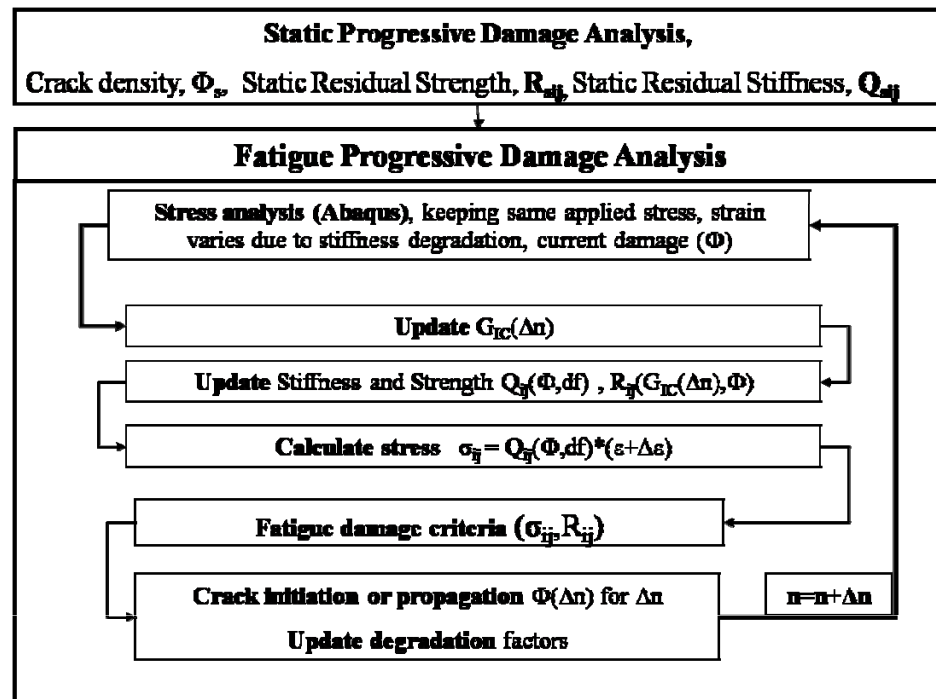
Given a load, calculate structural strength by estimating damage propagation thru FEA

Fatigue loading

Method of Approach

What model do we need?

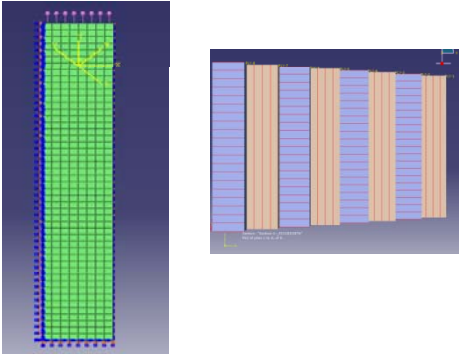
- Need a micro-scale model.
- We would like a complete mechanistic fracture mechanics approach.
- We also want a ply based model, not a laminate based model.
- Minimize the experiments needed to characterize material response.



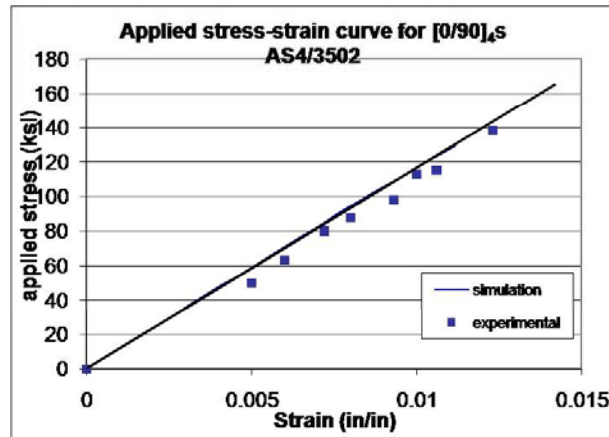
Results

Static Laminate response

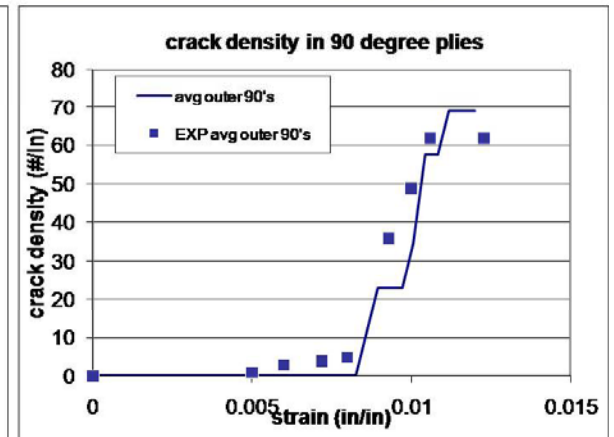
Case 1 : $[0/90]_4s$



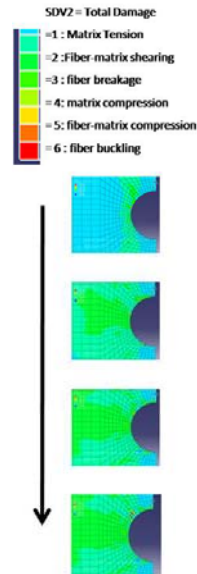
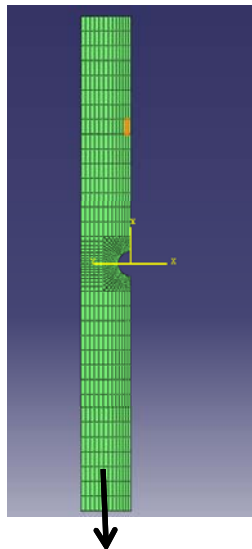
Simulation is within:
5.3 % of experimental data!



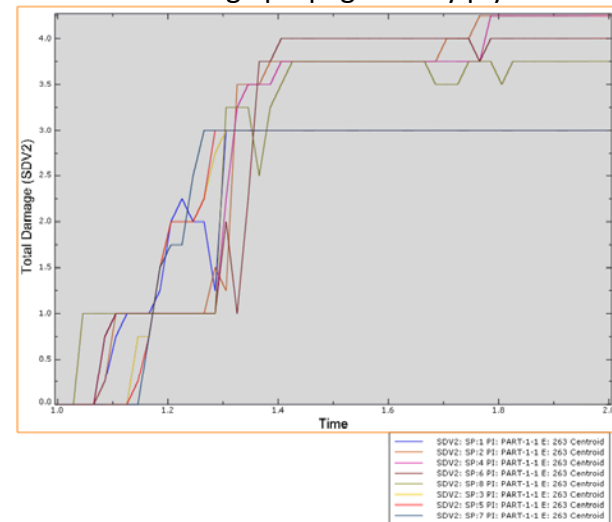
9.5 % of experimental data



T800, $[0/90]_8$
plate with a hole.



Damage propagation by ply



Bio



RESEARCH INTERESTS:

Interested in Aero/Astro Structures (Composite materials).

EDUCATION:

Bachelor of Science in Aerospace Engineering, May, 2007.

San Diego State University

Master of Science in Aeronautics and Astronautics,
December, 2008. Stanford University.

HOBBIES:

- Surfing - Travelling - Swimming

EMPLOYMENT:

– 6/2008 – present - NASA Ames Research Center, Structural Analyst, composite structures.

– 8/2005 –05/2007 – Minority Access to Research Careers Fellow. Research on Insect flight; dragonfly wing structure and aerodynamics

– 6/2006 – 8/2006 – NASA Langley Aerospace Research Summer Scholar (LARSS).
Advanced materials and processing branch.

5/2005-12/2005 - Quatro composites division of Tec Industries, Poway, Ca. Process Engineer,.