Reducing Uncertainty in Reliability of Structures and Materials

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Introduction

Education:

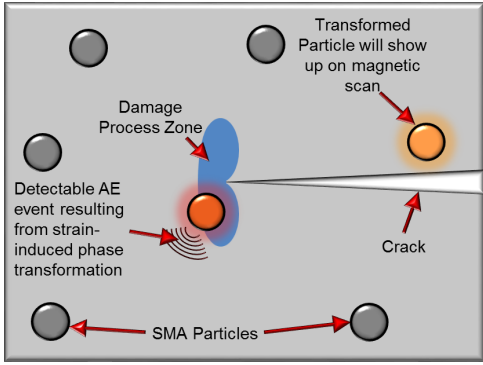
- B.S. Aerospace Engineering – North Carolina State University, 2008
- M.S. Aerospace Engineering – North Carolina State University, 2010
- Ph.D. Aerospace Engineering – North Carolina State University, 2014

NASA student pipeline:

- Langley Aerospace Research Summer Scholars (LARSS) Program, 2009
- NASA Graduate Student Researchers Project, 2009
- Pathways, 2012

Sensory Alloys

Objective: Embed shape memory alloy particles into an aluminum alloy to increase the acoustic energy released during crack growth in order to enhance passive damage detection via acoustic emission (AE) monitoring

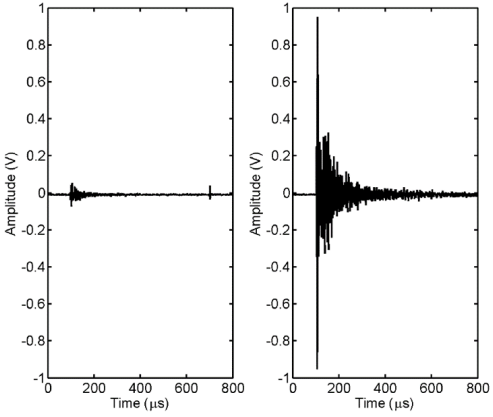


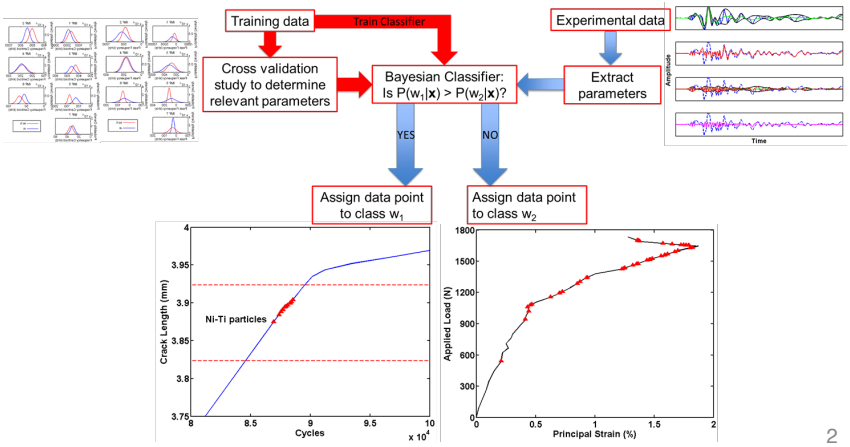
NASA Programs:

- Integrated Vehicle Health Management (IVHM)
- Advanced Air Vehicles Program (AAVP)

Results:

- Proof of concept demonstration
- Ph.D. Dissertation
- ICAS/IFAR Award





Digital Twin

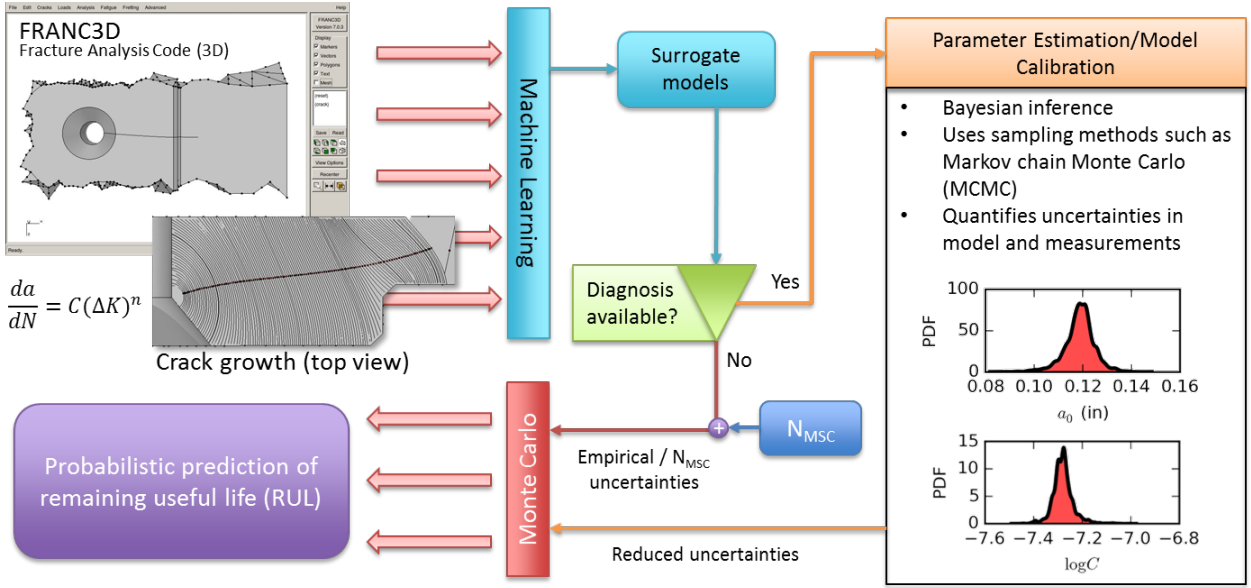
Objective: Address certification and reliability issues with next generation structures and materials through the close coupling of high-fidelity computational models and in-service data

NASA Programs:

- Convergent Aeronautics Solutions (CAS) Project

Results:

- Successful completion of feasibility assessment



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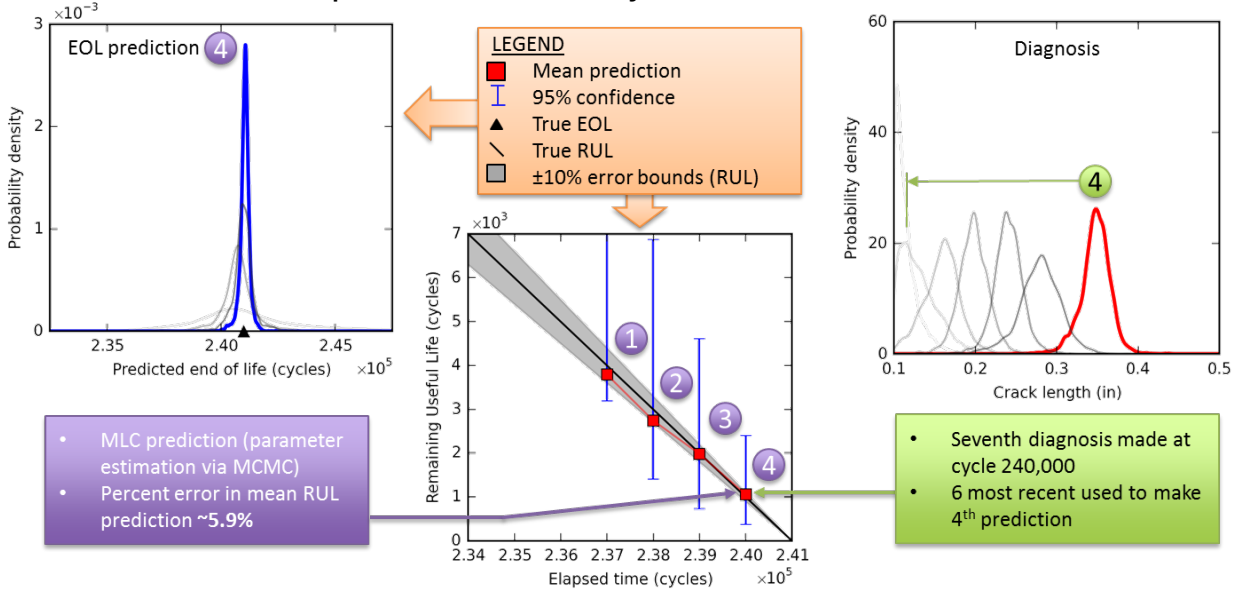

NESC - Frangible Joint Assessment

Objective: Understand the physics of frangible joint operation and assess their reliability to determine suitability for use in human space flight operations

NASA Programs:

- Commercial Crew Program (CCP)

Results:

- Delivered recommendations to CCP
- Tools and test methods for hardware qualification and reliability assessments of future designs