NEWS RELEASE

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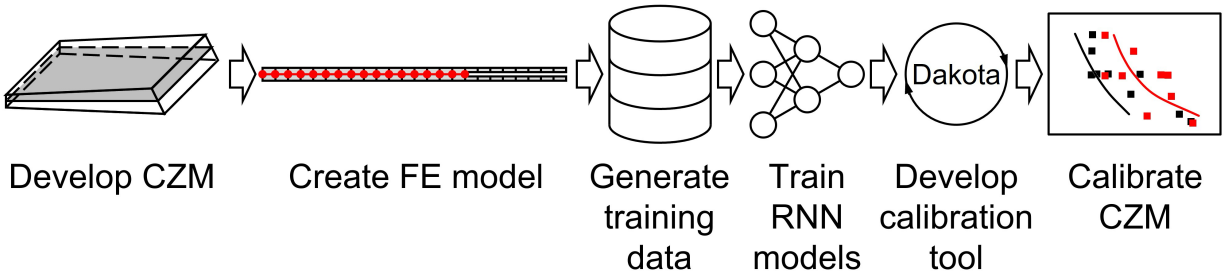
AnalySwift Researchers Earn Prestigious Award for Fatigue Simulation in Aerospace Composites

Researchers at AnalySwift and its partners receive the 2024 Boeing Best Paper Award.

West Lafayette, Indiana (USA) - AnalySwift, LLC, a provider of efficient high-fidelity modeling software for composites and other advanced materials, announced today that its researchers were awarded the prestigious 2024 ASME Boeing Best Paper Award for its innovative work in modeling fatigue delamination in composites.

The award was received for research advancing the simulation of fatigue delamination in composites. It was presented by the Aerospace Division of the American Society of Mechanical Engineers (ASME) at the ASME 2024 Aerospace Structures, Structural Dynamics, and Materials (SSDM) Conference in Seattle, Washington May 2024.

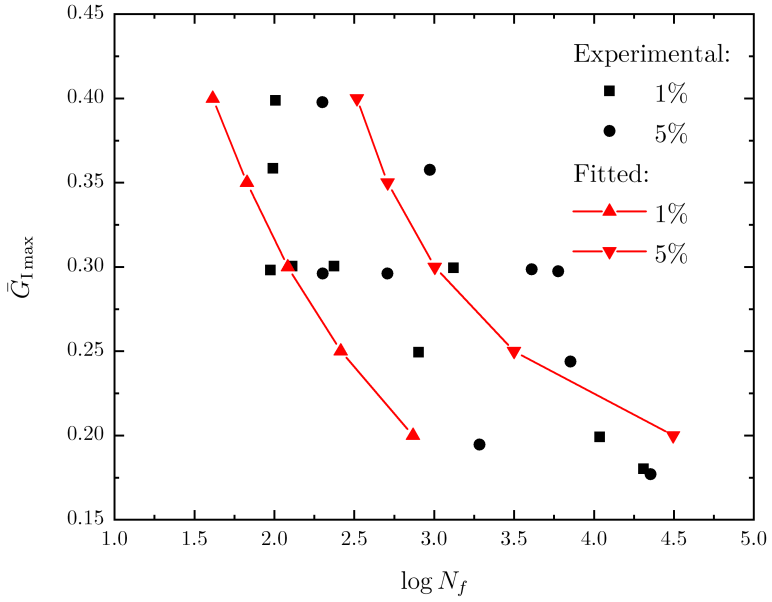
The paper, *Machine Learning-aided Cohesive Zone Modeling of Fatigue Delamination*, was authored by Dr. Liang Zhang, AnalySwift senior research scientist, and coauthored by Dr. Su Tian and Dr. Wenbin Yu of AnalySwift, as well as partners Dr. Xin Liu, assistant professor at University Texas at Arlington and Dr. Zhenyuan Gao of Dassault Systemes Simulia Corp.



Calibration workflow

This paper demonstrates a machine learning-aided cohesive zone model (CZM) for fatigue delamination in composite structures. Named string-based, the CZM effectively handles pure and mixed fatigue delamination and spectrum loading sequences due to its solid thermodynamic foundation. An implicit integration scheme enhances predictive accuracy, while a conditional recurrent neural network (RNN) serves as a substitute for computationally expensive finite element analysis (FEA) and aids in model calibration. Utilizing the Dakota toolkit alongside the RNN streamlines parameterization, automation, and acceleration of model calibration. Validation is conducted through calibrating the CZM's interface parameters using constant amplitude double cantilever beam (DCB) tests. The CZM holds potential for adaptation to address various types of fracture or interfacial debonding. This technology will be incorporated into AnalySwift's SwiftComp software.

"Accepting this prestigious award is an honor that underscores the transformative impact of collaborative research and technological innovation in aerospace engineering and beyond," said Zhang. "We, the authors, extend our heartfelt appreciation to ASME for recognizing our contributions, as well as to our supporters who have fueled our journey. Looking ahead, we are committed to pushing the boundaries of possibility, driving innovation, and striving for a brighter, more sustainable future."



G–N relationships

"This paper attempted to solve a challenging problem in mechanics of composites using machine learning along with rigorous thermodynamics principles. A very promising method has been found for life prediction of aerospace composites," Yu says. "This award remains as the most prestigious and coveted 'best paper' award in aerospace structures, structural dynamics, and materials in its almost half-century history."

The Boeing Structures and Materials Award, presented annually by the American Society of Mechanical Engineers since 1979, recognizes an outstanding paper on the basis of originality and significance to the field.

About AnalySwift
AnalySwift, LLC is a provider of composite simulation software, which enables an unprecedented combination of efficiency and accuracy, including multiphysics structural analysis and micromechanics modeling. Drawing on cutting edge university technology, AnalySwift's powerful solutions provide customers a competitive advantage through drastic reductions in engineering time, virtual testing earlier in the design process, and handling of more complex composite structures. The company's technologies deliver the accuracy of detailed 3D FEA at the efficiency of simple engineering models, cutting analysis time by orders of magnitude. SwiftComp is licensed from Purdue Research Foundation. VABS is licensed from Utah State University, Georgia Institute of Technology, and Purdue University. Find out more at analyswift.com.

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