Jurui Liu

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EDUCATION

M.S in Solid Mechanics 09/2021–06/2023

Harbin Institute of Technology, Harbin, China

GPA：90.85/100 Ranking:25/258

B.S. in Engineering Mechanics 09/2017–06/2021

Nanjing University of Aeronautics and Astronautics, Nanjing, China

GPA:90/100 Ranking:8/58

EXPERIENCES

Visiting Student 10/2022 –06/2023

Delft University of Technology, Delft, Netherlands

Research topic: Fatigue experimentation of composite under hygrothermal conditions (Under the supervision of Prof. R.C.Alderliesten)

Research Assistant 08/2023–Now

City University of Hong Kong, Hong Kong, China

Research topic: Preparation and mechanical analysis of carbon fibre composites with multilayer internal interfaces (Under the supervision of Dr. Wangbin)

PUBLICATIONS

1. Yao L(Supervisor), **Liu J**, Lyu Z, et al. In–situ damage mechanism investigation and a prediction model for delamination with fibre bridging in composites[J]. Engineering Fracture Mechanics, 2023: 109079. (Q1, IF: 5.4)

2. Yao L(Supervisor), Chuai M, **Liu J**, et al. Fatigue delamination behavior in composite laminates at different stress ratios and temperatures[J]. International Journal of Fatigue, 2023, 175: 107830. (Q1, IF: 6)

RESEARCH EXPERIENCES

Investigation of fatigue mechanism of whale baleen and numerical simulation of biomimetic structures

City University of Hong Kong, Department of Mechanical Engineering 06/2023–Now

Abstract: The baleen of whales can sustain hundreds of thousands of repeating bending motions throughout the whale's life during feeding. This work aimed to explore the excellent anti–fatigue mechanism of whale baleen. The bio–mimetic structures were proposed inspired by whale baleen and experiments and numerical simulation were conducted to verify the excellent mechanical performance of biomimetic structures.

- The microstructure of whale baleen was obtained by CT scanning and the numerical model was built, the excellent anti–fatigue mechanism of whale baleen was investigated by numerical simulation model;
- The numerical model of the biomimetic structure based on whale baleen was developed using ABAQUS. The simulation results were employed to elucidate the mechanism behind the remarkable mechanical performance exhibited by these biomimetic structures.

In–situ damage mechanism investigation and a prediction model for delamination with fibre bridging in composites

Harbin Institute of Technology, School of Astronautics 09/2021–05/2023

Abstract: Carbon fibre reinforced composites are susceptible to delamination. Fibre bridging is an important shielding mechanism frequently observed in delamination. In this work, in–situ SEM examinations were carried out to thoroughly explore damage mechanisms around delamination front as well as in bridging fibres. Based on the results of the examinations, a new traction–separation was proposed to represent fibre bridging performance. A FEM prediction model was finally developed to characterize delamination behavior with fibre bridging.

- In-situ SEM examinations were carried out to thoroughly explore damage mechanisms around delamination front as well as in bridging fibres;
- A new bridging law was proposed according to the fibre deformation behaviour during the delamination and combined with the theoretical analysis;
- A FEM prediction model was built by Abaqus to characterize delamination behavior with fibre bridging, and the new bridging law was achieved by Abaqus user subroutine VUMAT. The simulation results can agree well with the experimental data in the entire delamination, demonstrating its effectiveness in fibre-bridged delamination representation.

Fatigue and Quasi-static delamination experimentation of composite after hygrothermal conditions

Delft University of Technology, School of Aerospace Engineering 02/2023-05/2023

Abstract: Hygrothermal conditions are significant serving environments for composites, which negatively influence on mechanical performance of composite, in some cases, triggering premature failure. This study primarily focuses on assessing composites' quasi-static and fatigue properties after exposure to hydrothermal environments. SEM analysis was conducted on the cross-section of the composite after hydrothermal treatment to clarify the damage mechanism.

- Fatigue and quasi-static (Double Cantilever Beam, DCB) tests were performed on the composites after hygrothermal treatment. Comparative analysis was then conducted between the outcomes of these tests and those conducted under standard room conditions;
- Scanning electron microscopy (SEM) analysis was employed to investigate the damage mechanisms arising due to moisture within the hygrothermal environment

Fatigue and Quasi-static Mixed Mode bending delamination experimentation and simulation study of composites

Delft University of Technology, School of Aerospace Engineering 09/2022-02/2023

Abstract: Composite structures usually sustain mixed-mode loading in engineering practice, which leads to more investigation into the mixed-mode I/II delamination behaviour in laminated composites. Experiments and simulations were conducted to understand the mixed-mode delamination behaviour of composites.

- Three different mode mixtures fatigue and quasi-static mixed-mode bending (MMB) experiments were conducted on unidirectional composites;
- A mixed-mode bending FEM model was built by ABAQUS and successfully simulate the MMB tests.

AWARDS

Outstanding Master's Degree Thesis of Harbin Institute of Technology	05/2023
Outstanding graduate of Harbin Institute of Technology	04/2023
Outstanding student at Harbin Institute of Technology	11/2022
First class award of Harbin Institute of Technology Academic Scholarship	09/2022
Second class award of Harbin Institute of Technology Academic Scholarship	06/2021

SKILLS

Experiment: Mechanical test machine, such as Zwick, MTS, Scanning Electron microscope, etc.

Software: ABAQUS, Digimat, MATLAB, Solidworks, ImageJ, AutoCAD, Avizo,etc.