

Experimental investigation of the damage behavior under long-term loading of fiber-reinforced plastics

Typ of work: Bachelor Thesis/Master Thesis/Laboratory project



Motivation

The damage behavior of fiber-reinforced plastics is based on many different mechanisms, such as fiber breakage, interfacial failure between fibers and matrix, or matrix fracture. Acoustic emission (AE) analysis is an excellent tool for locating and detecting damage during loading (in-situ). The challenge here is to efficiently process the amount of data generated during cyclic loading. Furthermore, friction inside the material within already damaged areas leads to unwanted "noise". In order to filter the data in a meaningful way, approaches have to be found that allow a differentiation of the accruing sound signals. In addition, digital image correlation (DIC) makes it possible to detect near-surface damage and evaluate strain fields. A combination of the two measurement techniques (AE and DIC) can provide valuable information about the damage behavior of the composites if methods are found to record and evaluate the data efficiently.



Objectives

This work focuses on the investigation of the damage behavior of fiber-reinforced materials under long-term cyclic loading. The first objective is to integrate the measurement technique of acoustic emission and digital image correlation into the experimental setup so that measured data can be recorded. After that, the goal is to record measurement data and evaluate and interpret it to gain an understanding of the damage that occurs.



Requirements

- Studies in materials science, industrial engineering or similar, whereby permission to start the thesis/laboratory project has already been obtained on the basis of the applicable study regulations
- Previous experience in the field of materials science and composites desirable
- Interest in experimental research and data analysis
- Profound knowledge of English



Tasks

- Material and sample preparation
- Experimental setup and integration of measurement technology
- Execution and evaluation of experiments
- Identification of methods to eliminate "noise"
- Derivation of the damage behavior under long-term loading of fiber-reinforced composites
- Presentation of results and theory in scientific form
- Preparation of the main results and presentation in the chair seminar

Instruction scientific employee:

Anna Trauth

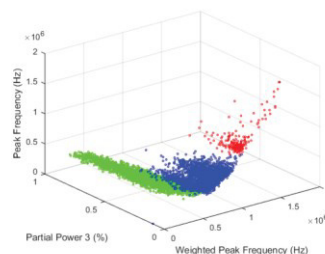
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Chair of hybrid composite materials

Group: Materials&Mechanics

Starting date:

Type of work:



anytime
experimental, Data based