A METHOD FOR NON-DESTRUCTIVE STRUCTURAL HEALTH MONITORING

IITM Technology Available for Licensing

Problem Statement

- ✓ Current **structural health monitoring methods** often require structures to be taken out of service for inspection, leading to downtime and cost.
- ✓ There is a **need for a non-destructive**, in-service monitoring solution that can provide **real-time structural health data** without disrupting normal operations, thereby optimizing maintenance schedules and **ensuring safety more effectively.**

Technology Category/ Market

Category – Non-destructive Testing (NDT) and Structural Health Monitoring Technology.
Applications – Aerospace engineering, Manufacturing
Industry - Aerospace, civil engineering, infrastructure management, manufacturing, and oil and gas
Market - Destructive Testing (NDT) Market was valued at USD 6.30 billion in 2021 and is expected to witness significant growth, reaching USD 16.66 billion by 2029, with a projected compound annual growth rate **CAGR of 13.66%** during the forecast period.

Intellectual Property

- **IITM IDF Ref. 861**
- **IN 373492 (PATENT GRANTED)**

Key Features / Value Proposition

Technical Perspective:
This invention employs **advanced cameras and computational techniques** for non-destructive structural health monitoring, **enabling real-time data collection and analysis.**
User Perspective:
The invention is **passive, in-service monitoring solution** that optimizes **maintenance schedules, enhances productivity,** and ensures **structural safety** without the need for downtime or service interruption.

Technology

Multiple Cameras:
The invention utilizes **two or more cameras** with adjustable orientations for **capturing images of the structure.**

Programmable Hardware Platform:
It employs a **hardware platform** capable of controlling image acquisition, performing **Digital Image Correlation (DIC)** computations, and post-processing results.

DIC Computation:
Digital Image Correlation is used to analyze **image data** and calculate **three-dimensional displacements** of the area of interest.

Mechanical Enclosure:
The device is housed within a **protective enclosure**, ensuring its durability and **suitable mounting on the structure.**

Versatility:
The technology can adapt **to various structures and sizes**, capturing images at different frequencies, making it suitable for a **wide range of applications.**

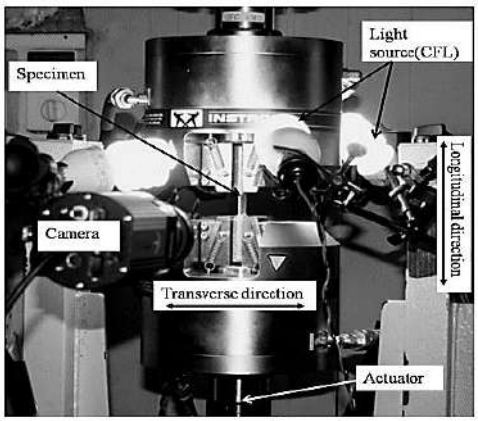

Fig.1 Experimental setup: specimen, periodic image camera, sample illumination lamps, and cyclical loading mechanical actuator.

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Images

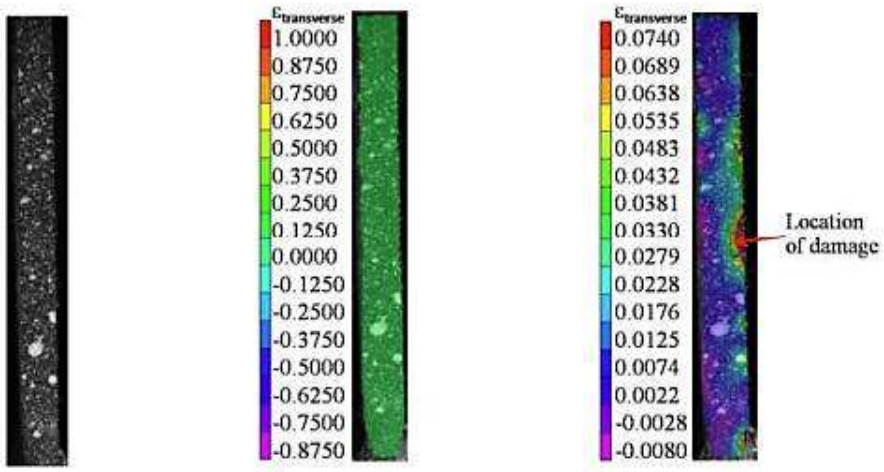

Fig.2 shows typical images and outputs from DIC.

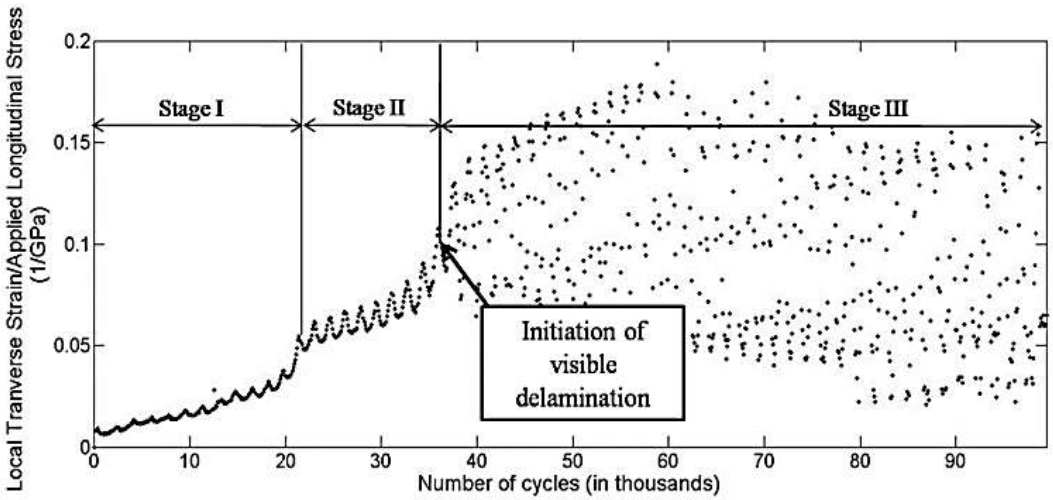

Fig.3 depicts evolution of specimen compliance with number of loading cycles, showing different stages of damage.

TRL (Technology Readiness Level)

TRL- 6, Technology demonstrated in relevant environment.

Research Lab

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