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DEPARTMENT OF
SCIENCE & TECHNOLOGY
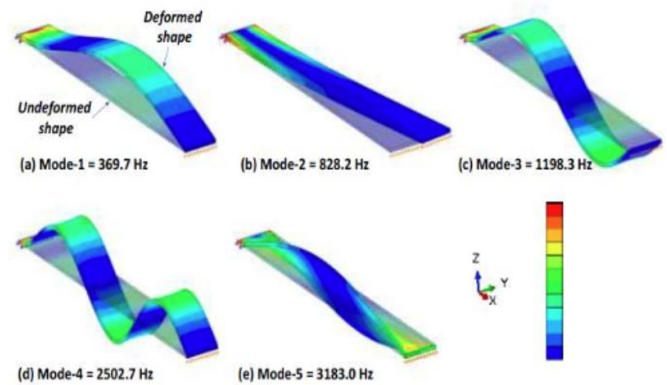सत्यमेव जयते

BITS Pilani
TECHNOLOGY
ENABLING
CENTRE
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PENDING

(IN202311047885)
System and method for designing laminate composite patches for shifting the natural frequency

(a) Mode-1 = 369.7 Hz   (b) Mode-2 = 828.2 Hz   (c) Mode-3 = 1198.3 Hz

(d) Mode-4 = 2502.7 Hz   (e) Mode-5 = 3183.0 Hz

NEED

More than 30% of mechanical structures suffer performance loss or early fatigue due to uncontrolled vibrations, leading to $5B maintenance costs globally every year. Traditional methods lack precision in tuning natural frequencies for specific operational needs, risking failures and downtime.

TECHNOLOGY OVERVIEW

This technology introduces a method and system that fine-tunes the natural frequencies of structures using modal strain energy analysis, laminate patch optimization, and simulation refinement. It adjusts vibration behavior precisely without redesigning or heavily modifying existing assets, enabling safer, longer-lasting, and more efficient structures.

TECHNOLOGY KEY FEATURES

Modal strain energy-based diagnosis, automated laminate patch selection, iterative optimization using FEA, compatibility with multiple materials and shapes, and minimal structural disruption deliver unmatched precision in vibration tuning.

Read more here

MARKET ANALYSIS

The global structural health monitoring market is projected to grow to $8.6 billion by 2033 at a CAGR of 14.5%, driven by aging infrastructure, safety standards, and smart materials adoption. [Source: MarketsandMarkets, 2024]

Target Industries

Smart Infrastructure Retrofitting, Aerospace Maintenance and Upgrades, Automotive Structural Tuning. , SHM technology providers, composite solution developers, retrofitting system integrators.

AT A GLANCE

• SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production)

Technology is available for licensing/ co-development.
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