

What is the function of a photoelastic modulator



Article Overview

A photoelastic modulator (PEM) dynamically modulates the polarization of light by inducing stress-dependent birefringence in a transparent optical material.

Principle of Operation

A PEM works based on the photoelastic effect, where a transparent material becomes birefringent when mechanically stressed, meaning it exhibits different refractive indices along different axes proportional to the applied strain (stress-induced birefringence). The device typically consists of a transparent optical element (commonly fused silica or calcium fluoride) and a piezoelectric transducer. The transducer vibrates the optical element at its resonant frequency, stretching and compressing it, which periodically changes the material's birefringence. This modulation alters the phase retardation between orthogonal polarization components of light passing through the PEM, effectively acting as a tunable wave plate.

Function and Applications

By modulating the polarization of light at high frequencies (typically around 50 kHz), PEMs enable highly sensitive and fast measurements in various optical experiments. They are used for:

- Polarimetry: Measuring optical rotation and circular dichroism in materials.
- Ellipsometry: Characterizing thin films and surface properties

Article Content

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Photoelastic Modulators (PEMs)

What is a Photoelastic Modulator (PEM) and how does it work? A Photoelastic Modulator (PEM) is an optical device that modulates

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Light Intensity Modulation Using a PEM

The PEM functions as a resonant device.1-3 Being driven at its fundamental vibrational frequency, the optical element of a PEM

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Calibration of photoelastic modulator using direct current component ...

Photoelastic modulator (PEM), using isotropic optical material and operating at the resonant frequency, is a phase

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Longitudinal piezoelectric resonant photoelastic modulator for ...

Transverse resonant photoelastic modulators, where the acoustic wave propagates perpendicularly to the optical wave, have an

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Photoelastic Modulator

This is why even an isotropic material like glass shows a first-order photoelastic effect, but cannot show a first-order electro-optical

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Photoelastic modulator

Photoelastic modulators are resonant devices where the precise oscillation frequency is determined by the properties of the optical

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Photoelastic modulator: polarization modulation and phase modulation

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Photoelastic Modulators

Photoelastic modulator is applied for changing the polarization state of light, and make the transmitted light have a dynamic phase

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Photoelastic Modulator

Photoelastic Modulator - Basic Principles Basic Principles The principle of operation of photoelastic modulators is based on the

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Frequency-response-free calibration of phase modulation amplitude of ...

Accurate calibration of the phase modulation amplitude in photoelastic modulators (PEMs) is critical for maintaining

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Principles of PEM Operation

View an Animated Tutorial of PEM Principles of Operation. The phenomenon of photoelasticity is the basis of operation for the PEM.

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A simple, inexpensive photoelastic modulator

A block of birefringent gelatin acts as a variable retarder when driven harmonically by a speaker coil and can be used

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Photoelastic Modulators (PEMs): A Comprehensive Overview

Conclusion Photoelastic modulators (PEMs) are powerful and versatile optical devices that play a crucial role in a wide array of

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Photoelastic modulator: polarization modulation and phase modulation ...

Photoelastic modulators are studied here as both birefringence (or polarization) and phase modulators. In the first part of this work

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Photoelastic Modulators (PEMs): A Comprehensive Overview

Photoelastic Modulators (PEMs): A Comprehensive Overview Photoelastic modulators (PEMs) are sophisticated optical devices that

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Photoelastic modulator

A photoelastic modulator (PEM) is an optical device used to modulate the polarization of a light source. The photoelastic effect is

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PEMs in Ellipsometry

The peak retardation is the amplitude of the sinusoidal retardation as a function of time. A photoelastic modulator induces modulated

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Photoelastic Modulated Imaging Ellipsometry

Photoelastic modulator (PEM)-based ellipsometry employed either lock-in amplifiers or the Fourier analysis technique

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Physics:Photoelastic modulator

A photoelastic modulator (PEM) is an optical device used to modulate the polarization of a light source. The photoelastic effect is

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Overview of Phase Modulation Technology

Both polarizers are held fixed during the measurement while the photoelastic modulator is used to induce a mod-ulated phase shift of

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The PEMCSC photoelastic modulator is an instrument used for

The PEM may be used in two basic modes: as a modulator, to produce polarization modulation of a light beam, or as an analyzer, to

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Basic optical properties of the photoelastic modulator part I: useful ...

The photoelastic modulator (PEM) is a resonant polarization modulator. It operates at the resonant frequency of a

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Longitudinal piezoelectric resonant photoelastic modulator for ...

Here, we report a new type of single frequency intensity modulator that we refer to as a longitudinal piezoelectric

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Photoelastic light modulators – advanced products by Acal BFi

Photoelastic light modulators Photoelastic modulators (PEMs) are a key component across a diverse range of photonic applications.

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