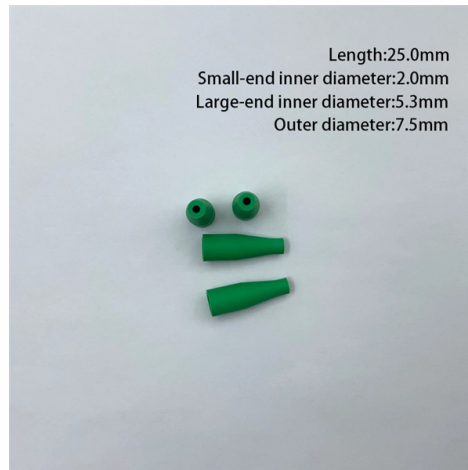


The function of a high-frequency photoelastic modulator



Article Overview

High-Frequency Photoelastic Modulators (PEMs) are optical devices that modulate the polarization of light at tens to hundreds of kHz using the photoelastic effect for precise, high-speed measurements.

Principle of Operation

A PEM operates based on the photoelastic effect, where a transparent material exhibits birefringence proportional to applied mechanical stress. The device typically consists of a piezoelectric transducer attached to a resonant optical element, often made of isotropic materials like fused silica or quartz. The transducer vibrates the optical element at its resonant frequency, inducing periodic changes in refractive index along orthogonal axes. This results in a phase retardation between polarization components of light, effectively modulating its polarization state.

High-Frequency Operation

High-frequency PEMs can operate in the range of 20 kHz to over 80 kHz, enabling rapid polarization modulation suitable for real-time optical measurements. The resonant design ensures stable and precise modulation, with minimal mechanical wear since there are no moving parts. The modulation frequency is largely fixed by the optical element's length and material properties, though minor tunability is possible.

Key Features



Article Content

Photoelastic Modulators

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

Photoelastic modulator explained

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

Photoelastic Modulator

Photoelastic Modulators (PEM) are state-of-the-art modulation devices designed to alter the polarization

Photoelastic modulator explained

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

Overview of Phase Modulation Technology

Overview of Phase Modulation Technology The UVISEL range of HORIBA Jobin Yvon spectroscopic ellipsometers use photoelastic

Photoelastic Modulator

Our Photoelastic Modulators deliver precise, high-frequency polarization modulation. Available in 1D and

Basic optical properties of the photoelastic modulator: Part I. Useful ...

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

A high retardation-amplitude photoelastic modulator study for an ultra ...

1. Introduction The photoelastic modulator (PEM) is a resonant polarization modulator operating on the basis of the

Principles of PEM Operation

If the optical element is compressed, the polarization component parallel to the modulator axis travels slightly faster than the vertical

Overview of Phase Modulation Technology

The output head comprises a photoelastic modulator and an analysing polarizer that re-solves the polarization state of the reflected

(PDF) Applications of the Photoelastic Modulator to Polarization ...

Compared to state-of-the-art resonant photoelastic modulators, the modulator reported in this work exhibits greater

Photoelastic Modulator

Basic Principles The principle of operation of photoelastic modulators is based on the photoelastic effect, in which a mechanically

PEMs in Ellipsometry

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

PEM Applications Overview | PDF | Polarization (Waves) | Optics

The photoelastic modulators (PEMs) are polarization modulation devices. The PEM is typically used as the key component for

Photoelastic Modulation

Photoelastic Modulator Technology This technology section describes the principles of operation, and modes and unique features of

Photoelastic modulator

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

Photoelastic Modulators (PEMs): A Comprehensive Overview

Their ability to modulate light polarization at high frequencies has made them indispensable tools in various scientific and industrial

Longitudinal piezoelectric resonant photoelastic modulator for ...

The modulation frequency is application-specific, however, for many applications a higher frequency is desirable, especially for lock

Photoelastic Modulators

The refractive index of the optical material will change periodically due to the photoelastic effect, which changes the phase

Physics:Photoelastic modulator

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

Longitudinal piezoelectric resonant photoelastic modulator for ...

Optical intensity modulators are an important component in optics. Here, the authors demonstrate a type of resonant

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

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

Photoelastic Modulators (PEMs)

A Photoelastic Modulator (PEM) is an optical device that modulates the polarisation of light to gain information about mechanical

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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