

Phase light modulator



Article Overview

A Phase Light Modulator (PLM) controls the phase of light on a pixel-by-pixel basis, enabling precise wavefront shaping for applications like holography, beam steering, and structured illumination.

How PLMs Work

Phase Light Modulation shapes monochromatic light by modifying the phase of the wavefront at each pixel, rather than controlling intensity directly. Each pixel slightly delays or advances the reflected light, creating a programmable phase pattern. When the phase-shaped light propagates, interference between waves forms the desired intensity distribution at the image plane. Unlike Digital Light Processing (DLP), which tilts mirrors to modulate brightness (amplitude), PLMs move mirrors up and down in piston mode to impose phase shifts, allowing phase-only control.

MEMS-Based PLMs

Texas Instruments' PLM is a MEMS micromirror array derived from DLP technology. Each micromirror can move vertically across multiple discrete heights (typically 16 levels), producing controllable phase shifts on the reflected beam. This architecture supports high-speed operation (up to several kHz) and tolerates high laser power densities, making it suitable for laser beam steering, lidar, and holographic displays. The mirrors' electrostatic actuation allows precise phase control, though phase levels are often non-linearly distributed, which can affect diffraction efficiency.

Applications

PLMs are widely used in areas where wavefront shaping is critical:

Article Content

Phase Light Modulator (PLM) Technologies

make DLP®'s Phase Light Modulator technology a great choice for many new applications previously limited by the inherent

Spatial light modulator

A spatial light modulator (SLM) is a device that can control the intensity, phase, or polarization of light in a spatially varying manner.

Light Modulation | Jenoptik USA

Jenoptik light modulators are ideal for the amplitude, phase and polarization modulation of laser light in the visible and infrared

Optical modulator

An optical modulator is a device which is used to modulate a beam of light. The beam may be carried over free space, or propagated

Optische Modulatoren | Jenoptik

Jenoptik fertigt Modulatoren, mit denen Sie Amplitude, Phase oder Polarisation von Licht beeinflussen. Lassen Sie sich von unseren

Electro-optic modulator

Electro-optic modulator An electro-optic phase modulator for free-space beams An optical intensity modulator for optical

Spatial light modulator

Spatial light modulator Schematic of a liquid crystal-based Spatial Light Modulator. Liquid crystals are birefringent, so applying a

Texas Instruments Phase Light Modulator (PLM)

PLM (Phase Light Modulation) offers faster speed, better efficiency, and greater adaptability, providing advantages in fields where

Spatial Light Modulator Principles

Spatial Light Modulator Principles Meadowlark Optics award-winning Spatial Light Modulators (SLMs) provide precision retardance

High-efficiency multi-scale holographic volumetric 3D printing with a ...

In this work, we present the first 3D printing platform utilizing a phase light modulator (PLM), based on an array of micro

TexasInstruments-Sandbox/ti-phase-light-modulator

TI PLM (Phase Light Modulator) Easy TI PLM data formatting and phase processing in Python. This library provides utilities designed

Phase Light Modulation Explained

Phase Light Modulation (PLM) is a way to shape monochromatic light by controlling the phase of the wavefront pixel-by-pixel. Instead

Contact Us

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