Construct, Conduct & Comprehend Physics Experiments

LEOI-33A Experimental System for Crystal Acousto-Optic Effect

- *Easy operation*
- *Precise measurement*
- *CCD option*
- *Complete solution*

Acousto-optic effect is based on the change in the refractive index of a medium due to the presence of sound waves in the medium. This creates a refractive index grating in the material that can be used to diffract light. It provides a powerful means to the control of the frequency, direction, and intensity of a laser beam. Employing acousto-optic effect, acousto-optic devices such as acousto-optic modulator, acousto-optic deflector, and tunable acousto-optic filter have been applied significantly to areas such as laser technology, optical signal processing, and integrated optical communication.

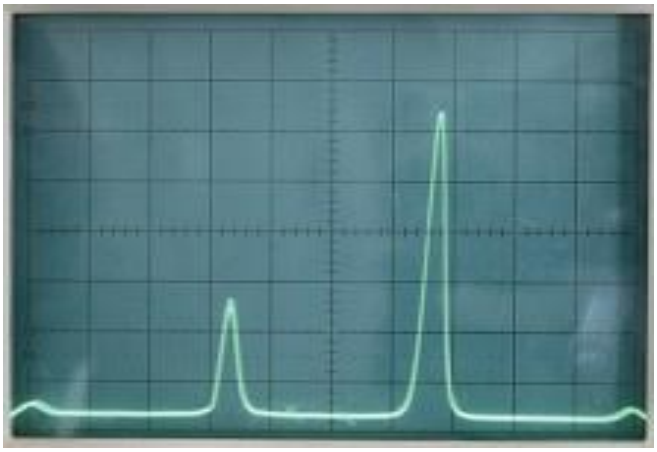
This experimental system consists of an acousto-optic modulator, a diode laser, a signal generator, a photo-receiving device, and an optical bench with carriers. There are two options of the photo-receiving device, i.e. a photo-cell with amplifier (option 1) for manual data acquisition, and a CCD (option 2) for real-time data display on an oscilloscope.

Experimental Contents

1. Compare Raman-Nath diffraction with Bragg diffraction.
2. Measure acousto-optic deflection in terms of diffraction angle versus ultrasound frequency.
3. Measure intensity of zero order and 1st order light versus ultrasound power.
4. Measure bandwidth and central frequency of acousto-optic device.
5. Measure diffraction efficiency of acousto-optic device.
6. Measure traveling velocity of ultrasound wave in acousto-optic device.
7. Simulate optical communication using acousto-optic modulation technique.

Parts & Specifications

Ultrasound Signal Source	Frequency: 80 - 120 MHz adjustable
	Output power: max 1 W, adjustable
	With modulation input port
Diode Laser	>3.0 mW @650 nm
Acousto-Optic Device	Center frequency: 100 MHz
	Bandwidth: 80 - 120 MHz
	Effective aperture: 1 mm
	Transmissivity: >96%
	Refractive index n = 2.386
	Bragg angle: 17.4 mrad
	Polarization of input light: any
Optical Bench	0.8 m, with 3 carriers
Transmitter	With internal musical signal & external modulation input ports
Receiver	Connected to a photocell, with speaker
Photocell Detector (option 1)	With 0.1 mm reading ruler & amplifier, connected to galvanometer
CCD (option 2)	pixel number: 2592; size: 11×11 μm; spectral range: 0.3~0.9 μm
	with synchronization/signal ports, connected to an oscilloscope



Graph observed on oscilloscope

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