Precision Retarders

Key Benefits

- True zero-order retarders
- Excellent off-axis performance
- Unequaled measurement accuracy
- Less temperature dependence than quartz waveplates
- Lower cost than compound zero-order quartz waveplates
- Better angular acceptance than compound zero-order quartz waveplates

Meadowlark Optics specializes in precision polymer retarders for the visible to near infrared region. Our Precision Retarders have the highest optical quality and tightest retardance tolerance of all polymer retarders. These true zero-order Precision Retarders consist of a birefringent polymer cemented between two precision polished, optically flat BK 7 windows. The retarder fast axis is conveniently marked for quick and easy reference.

Precision Retarders are supplied with a broadband antireflection coating. Optical transmittance of a Precision Retarder is typically greater than 97%.

The retardance δ at a wavelength λ that is different from the center wavelength λ_C is given by:

$$\delta \approx \delta_C(\lambda_C / \lambda)$$

where δ_C is the retardance at λ_C.

This relationship is very important when using sources which vary in wavelength from their nominal value. Figures 2-8 and 2-9 show the retardance behavior as a function of relative wavelength for a quarter- and half-wave retarder, respectively. The Mueller calculus described on page 24 can be used to calculate the transmitted polarization state based upon the retardance differences from the ideal case.

Since polymer retarders are true zero-order devices, they offer the significant advantage of improved angular performance. You can expect less than 1% retardance change over ±10° incidence angle.

Meadowlark Optics has developed precision ellipsometric techniques that can measure retardance to λ/1000.

Our metrology for these measurements is the best in the industry. You can have absolute confidence that the calibration measurements supplied with your retarder are of the highest accuracy obtainable.

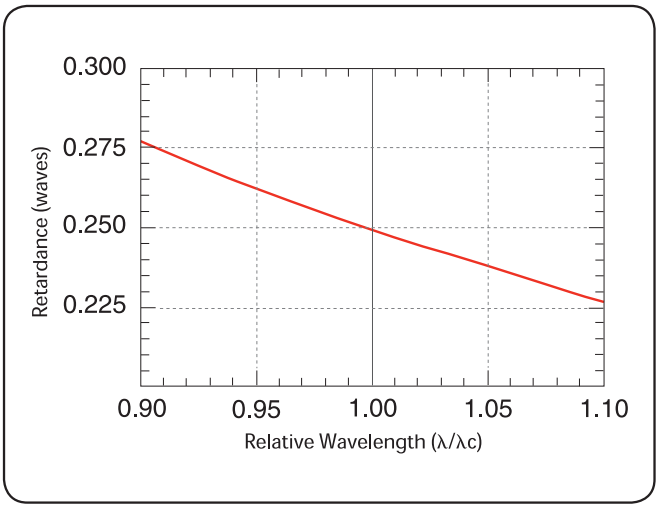

Fig. 2-8 Quarter-wave Precision Retarder performance

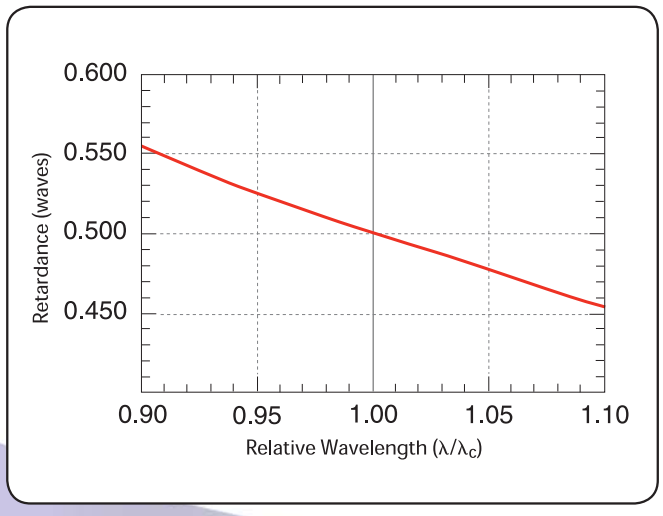

Fig. 2-9 Half-wave Precision Retarder performance

光技術をサポートする
株式会社オプトサイエンス
http://www.optoscience.com

東京本社 〒160-0014 東京都新宿区内藤町１番地 内藤町ビルディング
TEL:03(3356)1064 FAX:03(3356)3466 E-mail:info@optoscience.com
大阪支店 〒532-0011 大阪市淀川区西中島7-7-2 新大阪ビル西館
TEL:06(6305)2064 FAX:06(6305)1030 E-mail:osk@optoscience.com
名古屋営業所 〒450-0002 名古屋市中村区名駅2-37-21 東海ソフトビル
TEL:052(569)6064 FAX:052(569)8064 E-mail:ngo@optoscience.com

Precision Retarders

PROBLEM

"My laser center wavelength varies by a few nanometers, but I need my retarder to be a nearly perfect quarter-wave of retardance for each wavelength in order to give maximum isolation. I'll go broke if I have to purchase 10 retarders spaced at 0.5 nm intervals. Is there another way?"

SOLUTION

0.5 nanometers exceeds even our tight tolerance on retardance! Try angle tuning your retarder. A 10° tilt can change the retardance by about 1.25 nm or 0.002 waves of retardance at 632.8 nm. Remember to tilt about the fast or slow axis of your retarder, likely at ±45° to your optical bench. See our Application Note about retarders at www.meadowlark.com.

Another solution is to use a liquid crystal variable retarder, page 48.

PROBLEM

"I purchased a compound zero-order retarder for use in an imaging system where I need a good field of view. Do these really have the field of view of a true zero-order retarder?"

SOLUTION

This is a common misconception. In fact, compound zero-order retarders are twice as bad as the multi-order retarders they are made from! If you need a good field of view, you must use a true zero-order retarder. See our Application Note at www.meadowlark.com.

SPECIFICATIONS	
Retarder Material	Birefringent Polymer
Substrate Material	BK 7 Grade A, fine annealed
Standard Wavelengths	532, 632.8, 670, 780, 850, 1064 and 1550 nm
Custom Wavelengths	400-1800 nm (specify)
Standard Retardances	λ/4 and λ/2
Retardance Accuracy	≤ λ/350
Transmitted Wavefront Distortion (at 632.8 nm)	≤ λ/5
Surface Quality	40-20 scratch and dig
Beam Deviation	≤ 1 arc min
Reflectance (per surface)	≤ 0.5% at normal incidence
Diameter Tolerance	
Mounted Unmounted	±0.005 in. +0/-0.010 in.
Thickness Tolerance	±0.020 in.
Temperature Range	20° C to 50° C
Recommended Safe Operating Limit	500 W/cm², CW 600 mJ/cm², 20 ns, visible 4 J/cm², 20 ns, 1064 nm

Custom retardance values and sizes are available. Please call for a quote.

ORDERING INFORMATION

Mounted				
Diameter (in.)	*Clear Aperture (in.)*	*Thickness (in.)*	*λ/4 Wave Part No.*	*λ/2 Wave Part No.*
1.00	0.40	0.25	NQM-050-λ	NHM-050-λ
1.00	0.70	0.35	NQM-100-λ	NHM-100-λ
2.00	1.20	0.50	NQM-200-λ	NHM-200-λ
Unmounted				
Diameter (in.)	*Clear Aperture (in.)*	*Thickness (in.)*	*λ/4 Wave Part No.*	*λ/2 Wave Part No.*
0.50	0.40	0.13	NQ-050-λ	NH-050-λ
1.00	0.80	0.26	NQ-100-λ	NH-100-λ
2.00	1.60	0.51	NQ-200-λ	NH-200-λ

Please specify your center wavelength λ in nanometers when ordering.

Custom size retarders with improved transmitted wavefront distortion and/or beam deviation are available. Your requirements for custom shapes and sizes are also welcome. Please call for a quote.

Meadowlark Optics one and two inch diameter retarders conveniently fit our Rotary Mounts. Please refer to page 43 for more information.