

表 1 反射法测三棱镜顶角

实验 次数	左		右		$\angle A = \frac{1}{4}(\angle_{\text{左I}} - \angle_{\text{右I}} + \angle_{\text{左II}} - \angle_{\text{右II}})$
	I 窗	II 窗	I 窗	II 窗	
1	105°12'	285°13'	345°14'	165°8'	60°1'
2	200°11'	20°15'	80°18'	260°11'	59°59'
3	86°31'	266°32'	326°32'	146°25'	60°2'
4	71°2'	251°2'	311°7'	131°1'	59°59'
5	98°51'	278°50'	338°58'	158°51'	59°58'
6	215°48'	35°53'	95°55'	275°49'	59°59'

$$\overline{\angle A} = \frac{1}{6} \sum_{i=1}^6 \angle A_i = 60^\circ 0'$$

$$u_A = \sqrt{\frac{1}{5 \times 6} \sum_{i=1}^6 (\angle A_i - \overline{\angle A})^2} = 0.6', u_B = \frac{\Delta_{\text{仪}}}{\sqrt{3}} = \frac{1}{\sqrt{3}} = 0.6'$$

$$u = \sqrt{u_A^2 + u_B^2} = 1'$$

$$\angle A = \overline{\angle A} \pm u = (60^\circ 0' \pm 1')$$

表 2 三棱镜对波长为 $\lambda = 546.0nm$ 汞单色光的最小偏向角

实验 次数	$\theta_{\min I}$	$\theta_{\min II}$	θ_{0I}	θ_{0II}	$ \theta_{\min I} - \theta_{0I} $	$ \theta_{\min II} - \theta_{0II} $	δ_{\min}
1	182°30'	2°33'	128°33'	308°34'	53°57'	53°59'	53°58'
2	182°30'	2°33'			53°57'	53°59'	53°58'
3	182°29'	2°33'			53°56'	53°59'	53°57'
4	182°31'	2°33'			53°58'	53°59'	53°59'
5	182°31'	2°34'			53°58'	54°0'	53°59'
6	182°30'	2°33'			53°57'	53°59'	53°58'

$$\overline{\delta_{\min}} = \frac{1}{6} \sum_{i=1}^6 \delta_{\min i} = 53^\circ 58'$$

$$u_A = \sqrt{\frac{1}{5 \times 6} \sum_{i=1}^6 (\delta_{\min i} - \overline{\delta_{\min}})^2} = 0.3', u_B = \frac{\Delta_{\text{仪}}}{\sqrt{3}} = \frac{1}{\sqrt{3}} = 0.6'$$

$$u = \sqrt{u_A^2 + u_B^2} = 1'$$

$$\delta_{\min} = \overline{\delta_{\min}} \pm u = 53^\circ 58' \pm 1'$$

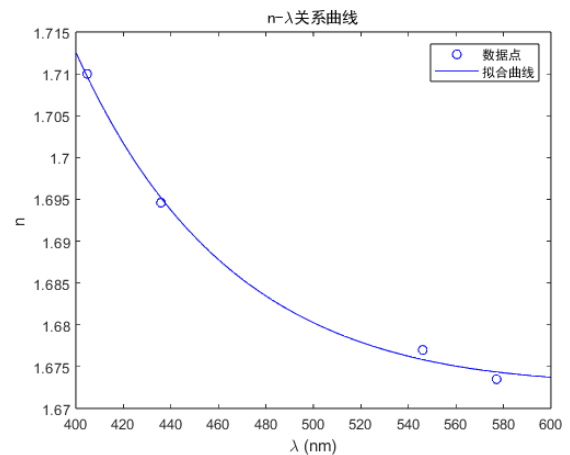
表 3 三棱镜对汞灯各单色光的最小偏转角与折射率

波长 λ / nm	$\angle A$	δ_{\min}	折射率 $n = \frac{\sin \frac{\angle A + \delta_{\min}}{2}}{\sin \frac{\angle A}{2}}$
404.7 (紫)	$60^\circ 0'$	$57^\circ 31'$	1.7100
435.8 (蓝)		$55^\circ 50'$	1.6946
546.0 (绿)		$53^\circ 58'$	1.6770
577.1 (黄)		$53^\circ 36'$	1.6735

根据柯西色散公式 $n = a + \frac{b}{\lambda^2} + \frac{c}{\lambda^4}$ 使用

MATLAB 拟合 $n - \lambda$ 关系曲线

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lambda = [404.7 435.8 546.0 577.1];
LambdaSpace = linspace(400,600);
x = lambda.^(-2);
n = [1.7100 1.6946 1.6770 1.6735];
p = polyfit(x,n,2);
c = p(1);
b = p(2);
a = p(3);
nSpace = c*LambdaSpace.^(-4)+b*LambdaSpace.^(-2)+a;
plot(lambda,n,'bo',LambdaSpace,nSpace,'b-')
legend('数据点','拟合曲线',fontname='黑体')
title('n-\lambda 关系曲线',FontName='黑体')
xlabel('\lambda (nm)')
ylabel('n')
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拟合的曲线方程为

$$n = 1.6879 - \frac{1.2307 \times 10^4}{\lambda^2} + \frac{2.6017 \times 10^9}{\lambda^4}$$

此处 λ 的单位为 nm