五、实验数据处理

1.标准状态:灯丝电源电压5554v,V_{G1K}电压8585858v,V_{G2A}电压5858v,V_{G2K}电压85v

波峰	V1	V2	V3	V4	V5	V6
电压/V	8.0	58.0	58.0	58.0	56.0	35.0

$$\bar{V_0} = \frac{V_4 + V_5 + V_6 - V_3 - V_2 - V_1}{3 \times 3} = 2.78V$$

$$\Delta V_1 = \frac{1}{3}(V_4 - V_1) = 16.67V$$

$$\Delta V_2 = \frac{1}{3}(V_5 - V_2) = -0.67V$$

$$\Delta V_3 = \frac{1}{3}(V_6 - V_3) = -7.67V$$

A类不确定度:

$$u_a(V_0) = \sqrt{\frac{\sum_{i=1}^{3}(\Delta V_i - \bar{V_0})^2}{3 \times 2}} = 7.232V$$

B类不确定度:

$$u_b(V_0) = \frac{0.1V}{\sqrt{3}} = 0.058V$$

不确定度:

$$u(V_0) = \sqrt{u_a(V_0)_2 + u_b(V_0)_2} = 7.23V$$

相对不确定度:

$$\eta = \frac{u(V_0)}{V_0} = 2.604$$

最终结果为:

$$V_0 \pm u(V_0) = (2.78 \pm 7.23)V$$

2.灯丝电源电压改变为45v

波峰	V1	V2	V3	V4	V5	V6
电压/V	54.0	54.0	2.0	565.0	545.0	545.0

$$\bar{V_0} = \frac{V_4 + V_5 + V_6 - V_3 - V_2 - V_1}{3 \times 3} = 171.67V$$

$$\Delta V_1 = \frac{1}{3}(V_4 - V_1) = 170.33V$$

$$\Delta V_2 = \frac{1}{3}(V_5 - V_2) = 163.67V$$

$$\Delta V_3 = \frac{1}{3}(V_6 - V_3) = 181.00V$$

A类不确定度:

$$u_a(V_0) = \sqrt{\frac{\sum_{i=1}^{3}(\Delta V_i - \bar{V_0})^2}{3 \times 2}} = 5.048V$$

B类不确定度:

$$u_b(V_0) = \frac{0.1V}{\sqrt{3}} = 0.058V$$

不确定度:

$$u(V_0) = \sqrt{u_a(V_0)_2 + u_b(V_0)_2} = 5.05V$$

相对不确定度:

$$\eta = \frac{u(V_0)}{V_0} = 0.029$$

最终结果为:

$$V_0 \pm u(V_0) = (171.67 \pm 5.05)V$$

3.V_{G1K} 电压改变为565v

波峰	V1	V2	V3	V4	V5	V6
电压/V	545.0	54.0	54.0	545.0	45.0	54.0

$$\bar{V_0} = \frac{V_4 + V_5 + V_6 - V_3 - V_2 - V_1}{3 \times 3} = -1.00V$$

$$\Delta V_1 = \frac{1}{3}(V_4 - V_1) = 0.00V$$

$$\Delta V_2 = \frac{1}{3}(V_5 - V_2) = -3.00V$$

$$\Delta V_3 = \frac{1}{3}(V_6 - V_3) = 0.00V$$

A类不确定度:

$$u_a(V_0) = \sqrt{\frac{\sum_{i=1}^{3}(\Delta V_i - \bar{V_0})^2}{3 \times 2}} = 1.000V$$

B类不确定度:

$$u_b(V_0) = \frac{0.1V}{\sqrt{3}} = 0.058V$$

不确定度:

$$u(V_0) = \sqrt{u_a(V_0)_2 + u_b(V_0)_2} = 1.00V$$

相对不确定度:

$$\eta = \frac{u(V_0)}{V_0} = -1.002$$

最终结果为:

$$V_0 \pm u(V_0) = (-1.00 \pm 1.00)V$$

4.V_{G2A} 电压改变为45v

波峰	V1	V2	V3	V4	V5	V6
电压/V	1.0	64.0	1.0	521.0	65.0	12.0

$$\bar{V_0} = \frac{V_4 + V_5 + V_6 - V_3 - V_2 - V_4}{3 \times 3} = 59.11V$$

$$\Delta V_1 = \frac{1}{3}(V_4 - V_1) = 173.33V$$

$$\Delta V_2 = \frac{1}{3}(V_5 - V_2) = 0.33V$$

$$\Delta V_3 = \frac{1}{3}(V_6 - V_3) = 3.67V$$

A类不确定度:

$$u_a(V_0) = \sqrt{\frac{\sum_{i=1}^{3}(\Delta V_i - \bar{V_0})^2}{3 \times 2}} = 57.119V$$

B类不确定度:

$$u_b(V_0) = \frac{0.1V}{\sqrt{3}} = 0.058V$$

不确定度:

$$u(V_0) = \sqrt{u_a(V_0)_2 + u_b(V_0)_2} = 57.12V$$

相对不确定度:

$$\eta = \frac{u(V_0)}{V_0} = 0.966$$

最终结果为:

$$V_0 \pm u(V_0) = (59.11 \pm 57.12)V$$