**实验报告**

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实验名称：测定金属的杨氏模量

1. 数据处理

1、CCD 测杨氏模量

金属丝长度L=77.15cm，eL=1.5mm

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| i | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | d±σd/mm |
| d'/mm | 0.328 | 0.329 | 0.328 | 0.329 | 0.328 | 0.327 | 0.326 | 0.325 | 0.321 | 0.321 | 0.324±0.003 |

金属丝直径d的测量 d0=0.002mm，ed=0.004mm

r与m关系表

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| i | mi/g | ri/mm | r'i/mm | ri平均/mm | δLi=(r平均i+5-r平均i)/5/mm (经mi偏差的校正) |
| 0 | 0 | 2.92 | 2.93 | 2.925 | 0.111 |
| 1 | +200.20 | 3.05 | 3.05 | 3.05 | 0.112 |
| 2 | +200.03 | 3.16 | 3.16 | 3.16 | 0.110 |
| 3 | +200.18 | 3.26 | 3.25 | 3.255 | 0.117 |
| 4 | +200.05 | 3.37 | 3.36 | 3.365 | 0.117 |
| 5 | +199.93 | 3.48 | 3.48 | 3.48 |  |
| 6 | +200.00 | 3.60 | 3.62 | 3.61 |  |
| 7 | +200.17 | 3.70 | 3.72 | 3.71 |  |
| 8 | +200.12 | 3.84 | 3.84 | 3.84 |  |
| 9 | +199.85 | 3.95 |  | 3.95 |  |

逐差法处理：δL==0.1134mm, σδL=0.008mm, ΔL/m=5.67\*10^-4 m/Kg

E ==1.62\*10^11 Pa ，E±σE=(1.62±0.09)\*10^11 Pa

最小二乘法处理：r平均=，k=ΔL/m=5.66\*10^-4 m/Kg

σk=  
E ==1.62\*10^11 Pa ，E±σE=(1.62±0.04)\*10^11 Pa

2、梁弯曲测杨氏模量

梁厚度h的测量

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| i | 1 | 2 | 3 | 4 | 5 | h平均/mm |
| h/mm | 1.272 | 1.279 | 1.28 | 1.278 | 1.275 | 1.2768 |

刀口间距l=20.00 cm；梁宽度a=1.200cm

挠度λ与m关系表

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| i | mi/g | λi/mm | λ'i/mm | λi平均/mm | 3δλ=λi-λi+3/mm |
| 0 | 0 | 50.212 | 50.230 | 50.221 |  |
| 1 | 200 | 49.488 | 49.460 | 49.474 | 2.2855 |
| 2 | 400 | 48.760 | 48.702 | 48.731 | 2.3045 |
| 3 | 600 | 48.000 | 47.923 | 47.9615 | 2.2595 |
| 4 | 800 | 47.246 | 47.131 | 47.1885 |  |
| 5 | 1000 | 46.455 | 46.398 | 46.4265 |  |
| 6 | 1200 | 45.702 |  | 45.702 |  |

=2.06\*10^11 Pa

1. 分析与讨论

前一二个砝码r变化偏大原因：在加砝码之前金属丝未完全拉直，加前一二个砝码时金属丝处于非弹性形变阶段；

前一二个砝码r变化偏小原因：限转螺丝与小圆柱间有摩擦力，加砝码后金属丝伸长前需先抵消摩擦力。