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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. **数据处理**   1.多普勒法测声速(谐振频率f=37500Hz 室温=25℃)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Vr(m/s)** | **Δf正(Hz)** | **Δf反(Hz)** | **Δf=(Δf正+Δf反)/2** | **V=f×Vr/Δf(m/s)** | | 0.059 | 7 | 6 | 6.5 | 340.38 | | 0.068 | 8 | 7 | 7.5 | 340.00 | | 0.078 | 8 | 8 | 8 | 365.63 | | 0.087 | 8 | 9 | 8.5 | 383.82 | | 0.097 | 10 | 10 | 10 | 363.75 |       相对误差：     1. 相位法测声速  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | L1 | L1-1 | L2 | L2-1 | L3 | L3-1 | | 814.15 | 805.05 | 796.05 | 787.00 | 777.30 | 767.45 | | L4 | L4-1 | L5 | L5-1 | L6 | L6-1 | | 75.815 | 749.25 | 740.00 | 730.17 | 721.00 | 712.00 |       **相对误差：**  3.根据测量结果以及相对误差的计算可知：相位法测声速测量的声速的相对误差较小，结果较为准确。 |
| **六、结果陈述**  1.多普勒效应测声速实验测得声速为358.716m/s，相对误差为4.58%；  2.相位法测声速实验测得声速为350.326m/s，相对误差为1.34%；  3.相位法测声速测量的数据相对误差较小，测量更加准确。 |
| **七、思考题**  **1.分析压电陶瓷换能器的工作原理。**  压电陶瓷换能器的工作原理为当压力或张力施加到陶瓷片上时，机械形变会使陶瓷片的两端会产生极性相反的电荷，并通过电路产生电流，这种效应成为压电效应。压电效应是可逆的。当对压电陶瓷换能器施加交变电场会使其产生机械振荡，这种效应成为逆压电效应。压电陶瓷有一个谐振频率，电信号频率接近这个频率，机电耦合比较好，产生的超声波强度较高，接收到的电信号也强。  **2.实验中如何测量压电陶瓷的共振频率？**  将实验仪超声，波发射强度和接受增益调到最大，进入“多普勒效应实验”子菜单，切换到“设置源频率”后，按键增减信号频率，一次变化10Hz；用示波器观察接受换能器波形的幅度是否达到最大值，该值对应的频率即为压电陶瓷换能器的共振频率。 |
| **指导教师批阅意见** |
| **成绩评定**     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 预习  （20分） | 操作及记录  （40分） | 数据处理与结果陈述（30分） | 思考题  （10分） | 报告整体  印 象 | 总分 | |  |  |  |  |  |  | |