Opposition: Coin in a Balloon

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Problem 1: Coin in a Balloon

An inflated air balloon **contains a coin** and is **gently moved** to set the **coin rolling** around the inside of the balloon. Explain and investigate the **buzzing sound** produced in this experiment.

Task partially fulfilled.

Theory

1. Explanation of what causes the buzzing sound
2. Detailed theory about sound
3. Young modulus and Poisson ratio accounted for

1. Secondary frequency not main focus of the sound produced
2. Balloon surface behaviour assumed to be as standing waves on a string
3. Did not account for transverse and longitudinal strain (when the coin was rolling on the surface of the balloon)
4. Why the coin rolls in the balloon
5. Doppler shift in measurements not accounted

Experiment

✓

1. Confirmed the cause of the buzzing sound
2. Made a clear hypothesis
3. Made a clear conclusion

✗

1. No experimental setup
2. No explanation on how the measurements were conducted
3. Missing visual aids to represent the phenomenon or the setup
4. No explanation on how the velocity was kept constant
5. Did not show how the data was analysed (using audacity and how the frequency was determined)
6. Did not determine how the

Questions:

1. How can you be sure the buzzing sound was produced by the rolling coin and not by the vibration of the membrane?
2. What dependence of the frequency do you expect on relevant parameters for the deformation of the balloon?
3. How did you ensure the coin is in constant contact with the surface of the balloon (there isn't any sliding)?

Questions:

1. Did you make a comparison between the background noise, a coin with continuous smooth edge and a coin with edges?
2. Did you account for the balloon stretching when the coin exerts force perpendicular to the balloon surface?
3. In measuring the sound frequency how did you account for the Doppler shift?

Thank you!