Abu Dhabi University

Electromagnetics and Waves

Lab Report 2 : Transducer

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Contents

1 abstract

In this lab session we used the Hall effect transducer which outputs varying voltages resulting from changing magnetic fields which happens because of the changing distance between the magnetic screw and the transducer.

2 Introduction

The Hall effect Transducer
This Transducers is a component that indicates change in magnetic field with voltage. It basically converts one energy form to another. In our case, it is the Hall effect transducer gives an output voltage as it detects a change in magnetic field. This will be detected through the change in the distance between the screw(explained in procedure) and the transducer and that change in magnetic field will be indicated as a change in voltage in the software Lab View.
We will use the software Lab View for this particular lab. The transducer mounted on the hall effect sensor will detect the change in the magnetic field, the process by which happens is written in the procedure. The sensor is connected to the computer and through the software Lab View we will get different readings of the varying voltage resulting from that change in the field.

3 List of Equipment Setup

- Hall effect transducer/sensor
- The fixed screw to turn one revolution at time
- Lab View Software

4 Experiment Setup

A hall effect sensor or a hall effect transducer is just below the fixed screw on the board which we have to turn, that transducer is connected to the computer which means to the software LabView. Once the transducer detects change in the field, a voltage change s displayed on LabView.

5 Procedure

The equipment used was the rectangular board which is the hall effect sensor on which the transducer was mounted, a T shaped magnetic screw just above the transducer which we had to turn, the computer and the Lab View software. During the experiment, we had to turn the T shaped screw mounted just on top of the transducer. This screw is made of magnetic material; turning it one rotation/revolution at a time clockwise will reduce the distance by 0.05 inches. [20 rotations make it 1 inch closer, so 1 rotation would make it 0.05 inches closer) and thus vary the magnetic field that the transducer detects, this varying magnetic field is detected by the transducer caused by the reducing distance between the tip of the screw and the transducer after every single turn. We had to turn the screw one rotation at a time so that the tip was ultimately 0.03 inches from the transducer. The transducer detects and outputs different voltages. These output voltages depending on different magnetic fields is displayed digitally on the Lab View software.

6 Results and Discussion

Output Voltage (V)	Subsequent Distance change till 0.3 inches(inches)
2	Rotation1: 0.05 inches
2.21	Rotation2: 0.05 inches (0.1)
2.29	Rotation3: 0.05 inches (0.15)
2.34	Rotation4: 0.05 inches (0.2)
2.37	Rotation5: 0.05 inches(0.25)
2.39	Rotation6: 0.05 inches (0.3)

Table 1:

Lab View, using this relation between the voltage and distance, computed for us a mathematical relation which is $Y = ae^{bx}$. **??**

The application of this lab exercise is very similar to the components which measure Revolution Per Minute or RPM. If it has to check the RPM for a wheel then a magnet is placed on one position and the wheel rotates near a transducer, the transducer will detect the magnetic field change only when the part of the wheel where the magnet is placed is near it and it gets the Logic 1. In this case, the rate at which the transducer detects this change gives the RPM.

7 Conclusion

In this Lab session a good grasp over the concept of transducer was held and we got to know how a hall effect transducer really works. We also got to know the workings of the Lab View software and how it displays the data which, in this session was the output voltage.

References

8 Appendix

List of Figures

Figure 1: LabView Board

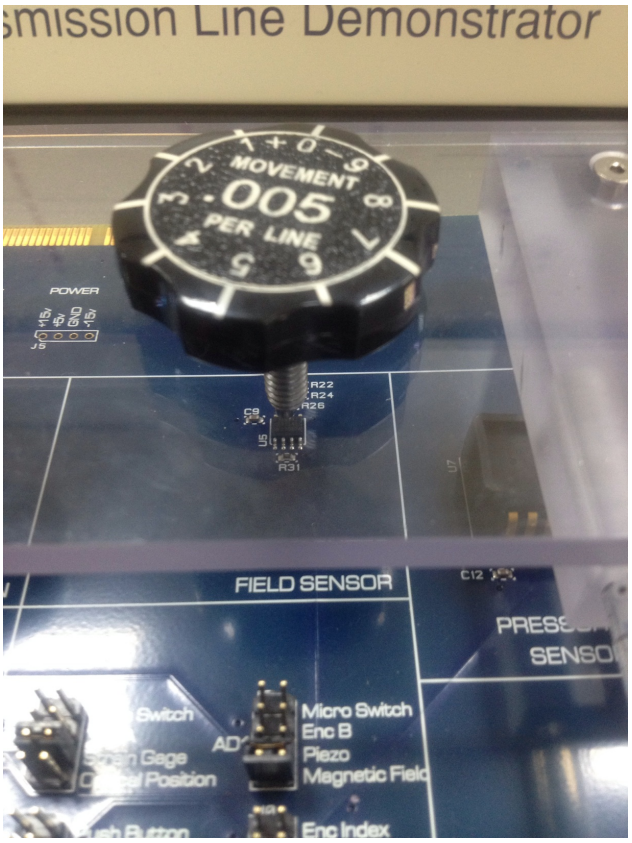

Figure 2: Magnetic Screw: Has to be turned One revolution at a time

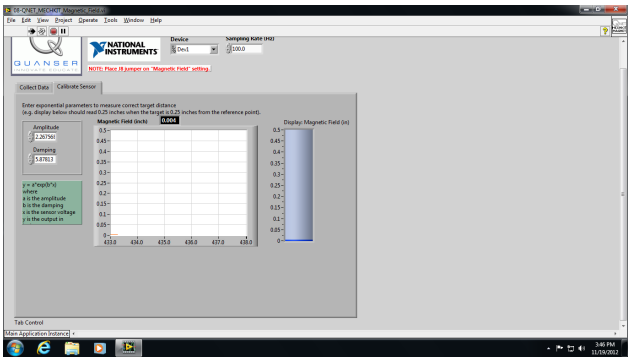

Figure 3:

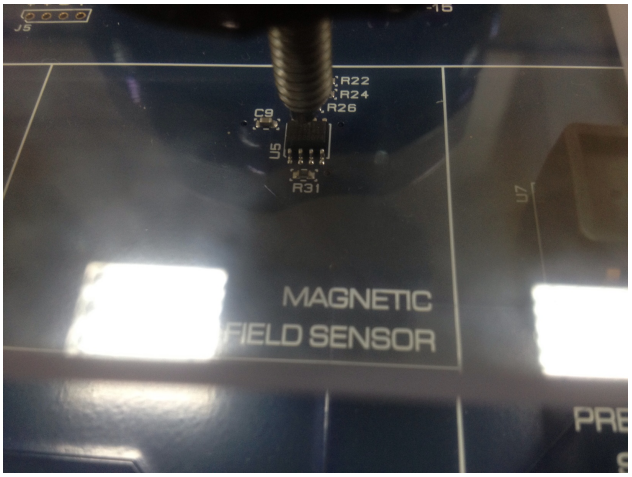

Figure 4:

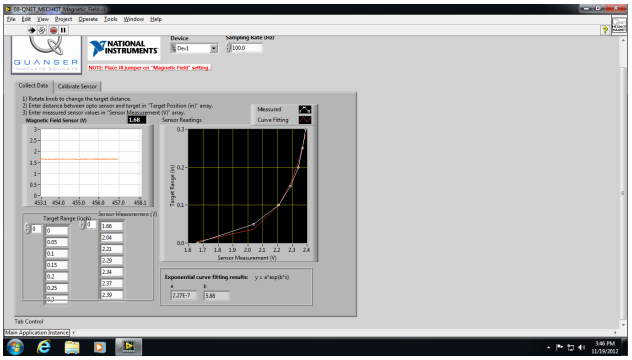

Figure 5:

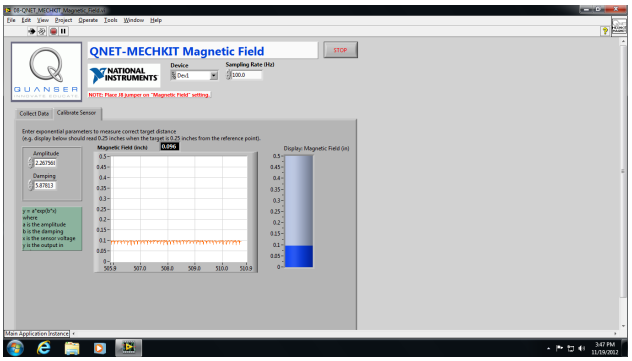

Figure 6:

Report/Member	Weight/Grade	Mirza Mohsin	Sifat	Ali Saadi	Muhammad Obaidullah
Abstract	10%	100%	0%	0%	0%
Introduction	20%	0%	50%	0%	50%
Procedure Part 1	10%	75%	0%	0%	25%
Procedure Part 2	10%	0%	75%	0%	25%
Procedure Part 3	10%	0%	0%	75%	25%
Results Part 1	10%	75%	0%	0%	25%
Results Part 2	10%	0%	75%	0%	25%
Results Part 3	10%	0%	0%	75%	25%
Conclusion	10%	0%	0%	100%	0%
Claimed Contribution		**25%**	**25%**	**25%**	**25%**
Contribution Validation Penalty		**0%**	**0%**	**0%**	**0%**
Overall Contribution		**25%**	**25%**	**25%**	**25%**
Overall Grade with Quality	**100%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Figure 7: Team Management Table