

PRELIMINARY REPORT: May 14, 2010

MEASUREMENT OF AN INDUCED ELECTROSTATIC FIELD ABOVE A ROTATING MAGNETIC DISK

SPS Chapter: Western Illinois University

SPS Chapter Address: 1 University Circle, Department of Physics, Macomb, IL 61455, tel. 309-298-1596

Abstract

It is commonly understood that the rotation of the magnet in a Faraday generator is immaterial. We propose to conduct precise measurements of the electric field above a rotating magnetic disc and show whether or not the rotation of the magnet does induce an electric field.

Preliminary Report

As of May 14th, 2010, we have made the following steps in carrying out the research described in our grant award application:

A design was developed by Dustin, Chris and Sean for the device needed to spin a 6 inch diameter and 1 inch thick N42 NdFeB magnet at 11,500 rpm. Dustin used a freely available software to model the design and another to make more precise predictions about the strength of the magnetic field at the surface of the magnet (~0.3 T near the magnet edge).

The equipment listed in the original proposal for this device was obtained, at the following cost:

China Magnet Source (N42 NdFeB magnet)	\$177.60
State Electric Company (Bodine A24 motor)	\$201.05
State Electric Company (KP DC control, switch, resistor, fuse)	\$203.12
VXB.com (2 hybrid ceramic/stainless steel bearings)	\$144.35
McMaster/Carr (12 in long, 7 inch diameter cast nylon rod)	\$142.97
Shipping Costs for Electric Field Sensor	?
Total	\$869.09

The Physics department supported the project with end-of-the-year funds to pay for the bearings and nylon rod. The researchers at the University of Michigan have sent the sensor and have graciously allowed us to use it till the end of May. The department of Engineering Technology at WIU has donated labor and equipment for the machining of the rod and frame that will be used to hold the motor and allow it to spin freely at the required 11,500 rpm, and is currently completing the machine-work.

We have also been holding SPS club/research meetings to involve our members in the design of the apparatus, to discuss the theory behind the experiment, and to use the equipment for the measurements. We have been video recording these sessions as a kind of "stardate log" for future interest. Dustin and Sean presented a poster on the project at WIU's Undergraduate Research Day on April 28th, 2010, which is attached.

Respectfully submitted,

James Rabchuk