Public Abstract
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A homopolar motor is a simple device which converts electrical energy into mechanical motion using the Lorentz force. The simplicity, low cost of materials, and compact size of this device has made it an important tool in today's world. It is being used in a number of applications, especially those where space and weight are of premium importance. The design, construction, and operating characteristics of a homopolar motor are described in this thesis using both physical experimentation and simulation software.

The energy from a nickel-metal hydride battery is discharged by creating a short circuit between the anode and cathode of the battery using an armature, a piece of non-magnetic conductive wire. When this current moves through a magnetic field which is not parallel to the wire, a Lorentz force is induced, causing the wire to exert a force on the ground strong enough to propel the apparatus forward. By using various armatures and lubricants, top speeds of 0.71 m/s are achieved. An electromechanical model of the homopolar motor is developed in PSpice. This simulation is used to predict the performance of the homopolar motor, including position and speed. Motor measured performance results and those predicted by computer simulation are compared and presented.