

# STEM Society Meeting, June 11, 2013

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## **1 About the STEM Society and the STEM Society Website**

STEM is an abbreviation for Science, Technology, Engineering and Mathematics. The acronym STEM is commonly associated with K-12 education, but our use of the term is only slightly bound to this meaning. There are over one hundred people on the mailing list, although a much smaller group attends any one meeting. We meet on the second Tuesday of each month at

the Trailside Center at 99th and Holmes in Kansas City, Missouri. The meetings are open to all. The start time is 6PM. We make presentations, have discussions, and have demonstration experiments. These relate to Science, the History of Science, Mathematics, Engineering, Philosophy and Technology at all levels. The topics have ranged from a technical discussion of the mathematics of General Relativity to scientific experiments for young students.

The set of meeting notes may be viewed by going down the list of notes appearing on the front page of the site. These notes contains links to documents, which may be viewed or downloaded by clicking the link. Other documents can be reached by clicking the heading "Documents and Downloads" that appears on the left side of the front page. Then click on "documents." The meeting notes may also be viewed in an archive file in the list of documents. Most of the documents are PDF files. They may be viewed or downloaded to the computer by clicking, provided Adobe Reader is present, or another program capable of reading PDF files. There are usually more documents available at the site than are listed under "Documents" because they are not in the documents.htm file.

**The web site is:**

<http://www.stem2.org/>

**Direct to the documents list:**

<http://www.stem2.org/je/documents.htm>

**Direct to the archive file:**

<http://www.stem2.org/je/archive.pdf>

**Last Months Notes:**

<http://www.stem2.org/je/stemsoc040913.pdf>

## **2 The June Meeting Announcement**

The June meeting of the STEM Society will take place on the second Tuesday of the month, June 11, 2013, at the Trailside Center at 99th and Holmes in Kansas City, Missouri. The starting time is 6PM.

A List of Possible Topics, and suggestions for preparatory homework before the meeting:

(1) An Explanation of Electrical Impedance: series and parallel resonance, experimental methods of measuring inductance, Amplitude Modulation of an RF electromagnetic wave, the magnetron: a generator of microwaves.

(2) Mapping equipotential lines in two dimensional current flow. The analogy between electrical potential (voltage) and terrain contour lines in civil engineering and geological mapping. Using cubic spline and Bezier curves and software.

(3) Building a Model of the Diamond Crystal Lattice.

(4) Apparatus and equipment display.

(5) Book Reviews

(6) 2013 Kansas City Maker Faire at Union Station

(7) As always, we welcome impromptu topics, projects, show and tell, book reports, problems and solutions in mathematics, physics, engineering, biology, scientific biographies, et cetera.

### **Future Topics:**

(1) Optimization Theory, Lagrange Multipliers, and the Golden Section Search.

(2) More Electronics and Circuits.

(3) Experimental Apparatus and Machine Building.

(4) The Calculation of Energy Levels in Semiconductors.

(5) Number Theory.

(6) The Postulates of Quantum Mechanics. See **Quantum Mechanics in Chemistry**, Melvin W Hanna, 3rd edition, p46. Messiah, **Quantum Mechanics, 2 Volumes**

The STEM Society Website:

<http://www.stem2.org/>

### 3 An Explanation of Impedance

We solve for the steady state solution of a series circuit with Resistance, Capacitance, and Inductance (RLC) driven by a sine wave source.

This presentation follows material from:  
Electrical Engineering and Electrical Circuits:

<http://www.stem2.org/je/ee.pdf>

And from:  
Complex Analysis:

<http://www.stem2.org/je/complex.pdf>

### 4 The Magnetron and Microwaves

Reference The Magnetron

<http://www.stem2.org/je/magnetron.pdf>

### 5 Raspberry Pi

The Raspberry Pi is a tiny complete computer, which runs a version of the Linux operating system. It was created by a group in England. The Raspberry Pi can be purchased for under 50 dollars. Bob Kessler presented one of these to me a few months ago, but I have not yet taken time to consummate

the relationship.

Richardson, Matt, **Getting started with Raspberry Pi** O'Reilly, 2012. Pages: xiii, 161 p. : ISBN: 1449344216, Kansas City Kansas Library.

Upton Eben, and Halfacree Gareth **Raspberry Pi: Readers Guide**.

## **6 Jim Emery: Complex Variables in Electrical Engineering and Equipotential Curves in Two Dimensional Current Flow**

<http://www.stem2.org/je/ee.pdf>

### **Basic Electricity**

<http://www.stem2.org/je/basicelectricity.pdf>

### **Show and Tell.**

**Electric Potential Lines for Planar Current Flow Through a Rectangular Tank of Water.**

<http://www.stem2.org/je/epotentials.pdf>

## **7 2013 Kansas City Maker Faire at Union Station, June 29-30**

We shall have an exhibit at this years Maker Faire. There will be a published description of the items displayed later.

<http://www.stem2.org/je/makerfaire2013.pdf>

## 8 The Electrocution War: Edison vs Westinghouse

From Wikipedia:

*"Topsy the elephant was electrocuted at Luna Park Zoo on Coney Island in 1903. Captured on film by Thomas Edison, the event was one of a string of animal electrocutions Edison staged to discredit a new form of electricity: alternating current.*

*The first person to be executed by the electric chair was William Kemmler in New York's Auburn Prison on August 6, 1890; the "state electrician" was Edwin F. Davis. The first 17-second passage of current through Kemmler caused unconsciousness, but failed to stop his heart and breathing. The attending physicians, Edward Charles Spitzka and Charles F. Macdonald, came forward to examine Kemmler. After confirming Kemmler was still alive, Spitzka reportedly called out, "Have the current turned on again, quick, no delay." The generator needed time to re-charge, however. In the second attempt, Kemmler was shocked with 2,000 volts. Blood vessels under the skin ruptured and bled, and the areas around the electrodes singed. The entire execution took about eight minutes. George Westinghouse later commented that "they would have done better using an axe," and a witnessing reporter claimed that it was "an awful spectacle, far worse than hanging." The first woman to be executed in the electric chair was Martha M. Place, executed at Sing Sing Prison on March 20, 1899."*

Auburn prison still exists in New York. It is near Syracuse.