

**Meeting:** 1003, Atlanta, Georgia, SS 27A, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, I

1003-37-176      **Carl V. Lutzer\*** (cvlisma@rit.edu), Dr. Carl V. Lutzer, Assistant Professor, Dept. of Math & Stats, Rochester Institute of Technology, Rochester, NY 14623-5603. *The Dynamics of Energy Harvesting*. Preliminary report.

Consider a device in which three parallel microbeams are suspended. The first (lowest) beam is rigid, fixed in place, and grounded. The second (middle) beam is also fixed in place and rigid but carries an embedded charge density of  $\sigma < 0$  that has been fixed in place. The third (top) beam is flexible and is connected to the lower, grounded beam by a line. The distance between the grounded and charged members is  $H$ , and the distance between the charged and topmost members is  $h$ .

When incidental mechanical energy provides an impulse to the device, the topmost microbeam begins to oscillate. Electrons flow out as it bends toward the charged member, and return as it moves away. In this manner, the device produces an alternating current. By capturing this electricity with two diodes and a capacitor, we have a 21st century version of the self-winding watch.

In this talk, the mathematical model for the energy harvester will be presented (cast as a system of nonlinear ODE with nonlinear boundary conditions) and analyzed. (Received August 18, 2004)