1003-78-1138   **David Isaacson*** (`isaacd@rpi.edu`), Math Department, RPI, Troy, NY 12180. *Electrical Impedance Tomography and Inverse Problems.*

Electrical Impedance Imaging Systems apply currents to a body's surface and measure the resulting voltages. From these measurements a reconstruction and display of the electrical conductivity and permittivity inside the body are made. Since hearts and lungs differ in conductivity when they are filled with blood or air from when they are depleted of blood and air the EIT images can be used to monitor ventilation and perfusion. Since breast tumors have a significantly higher conductivity than normal breast tissue EIT images may be used to diagnose breast cancer.

   We will explain how the spectral analysis of the Neumann to Dirichlet map for Maxwell's Equations on the boundary of the body can be used to design electrical impedance imaging systems.

   The possible improvement in detecting breast cancer from the use of the eigenfunctions of the Neumann to Dirichlet map will be explained and illustrated by experimental results. (Received October 04, 2004)