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David Isaacson* (isaacd@rpi.edu), Professor David Isaacson, Mathematical Sciences Department, Rensselaer Polytechnic Institute, Troy, NY 12180, and **J. C. Newell** and **G. C. Saulnier**. *Inverse boundary value problems arising in the diagnosis and treatment of heart disease and breast cancer.*

We explain how the problems of diagnosing breast cancer and heart disease motivated the design of our Adaptive Current Tomography systems. These systems apply currents and voltages to portions of a body and reconstruct and display the electrical properties of the tissues inside the body. It will be explained how the problem of imaging these electrical properties inside the body gives rise to inverse boundary value problems for Maxwell's equations. We will describe several methods for approximately solving these inverse boundary value problems. The talk will include images and movies of cardiac activity and breast cancers made by our ACT systems. It will conclude with a description of results from recent patient studies at Mass. General Hospital. (Received August 27, 2009)