1015-35-73 **Liliana Borcea**, **Vladimir Druskin** and **Fernando Guevara Vasquez*** (fguevara@caam.rice.edu), CAAM Dept. - MS 134, Rice University, 6100 Main st., Houston, TX 77005-1892. *Electric impedance tomography with circular planar graphs.*

Electric impedance tomography (EIT) consists in finding the conductivity inside a body from electrical measurements taken at its surface. This is a severely ill-posed problem: any numerical inversion scheme requires some form of regularization. We present inversion schemes that address the instability of the problem by proper sparse parametrization of the unknown conductivity.

Specifically, we consider finite volume grids of size fixed by the measurements, but where the placement of the grid points is to be determined adaptively, as part of the inverse problem. A finite volume discretization can be thought of as a resistor network, where the resistors are averages of the conductivity over grid cells. Under certain assumptions on the topology and size of the network, the resistors are uniquely recoverable from the measurements.

We show a numerical inversion method for the 2D EIT problem that is based on the solution of the model reduction problem of finding the smallest resistor network (of fixed topology) that can predict meaningful measurements of the Dirichlet to Neumann map. We show how our method can also incorporate a priori information about the solution and handle noisy measurements. (Received January 24, 2006)