1075-65-99 **Alexander V Mamonov*** (mamonov@ices.utexas.edu), 1 University Station C0200, Austin, TX 78712, and **Liliana Borcea**, **Vladimir Druskin** and **Fernando Guevara Vasquez**.
Resistor networks and optimal grids for electrical impedance tomography with partial boundary measurements.

In EIT with partial boundary measurements we determine the conductivity inside an object from the measurements of currents and voltages on a subset of its boundary. We regularize the ill-conditioned problem using resistor network models corresponding to discretizations on adaptive (optimal) grids. Two approaches implement this strategy.

The first approach uses the results for the full boundary measurements case, which rely on the use of circular resistor networks. The optimal grids in this case can be computed explicitly. The partial data problem is reduced to the full data case using extremal quasiconformal mappings.

The second approach is based on resistor networks with special graph topology. Pyramidal networks are used for the one-sided problem and two-sided networks are used for the two-sided case. The optimal grids are computed using the sensitivity analysis of the continuum and discrete EIT problems.

The numerical results show two main advantages of our approaches compared to optimization-based methods. First, network based inversion is orders of magnitude faster than any iterative algorithm. Second, our approaches correctly reconstruct the conductivities of very high contrast, which typically present a challenge to the traditional inversion methods. (Received August 24, 2011)