1086-65-1255 **Daniela Calvetti**, **Debra McGivney*** (dfm40@case.edu) and **Erkki Somersalo**. *Left and right preconditioning for Electrical Impedance Tomography with structural information.*

Computational inverse problems frequently give rise to linear or nonlinear least squares problems and an effective way to solve such problems is with Krylov subspace iterative methods. We present a computational scheme to be applied to electrical impedance tomography (EIT), a nonlinear, ill-posed inverse problem in which we look to estimate the admittivity distribution inside a body given current/voltage measurements made on the boundary. The problem is addressed in the Bayesian statistical framework with an inner-outer iterative scheme to compute the maximum *a posteriori* estimate with the aid of statistically inspired preconditioners. The right preconditioner arises from a structural prior covariance, while the left preconditioner accounts for the noise, which consists of the assumed measurement error and the modeling error due to a coarse discretization of the problem. The admittivity distribution is updated in the outer iteration and the linearized sub-problem is solved in the inner iteration via conjugate gradient for least squares, with an inexact Newton stopping criterion. Computational efficiency is also addressed in the solution of the forward problem with a finite difference discretization scheme resulting in a fast adjoint method to compute the Jacobian matrix. (Received September 20, 2012)