1143-49-15 **Ugur G. Abdulla**, **Vladislav Bukshtynov** and **Saleheh Seif*** (sseif2014@my.fit.edu), 316 Georgetown ave, Melbourne, FL 32901. *Breast Cancer Detection via Electrical Impedance Tomography and Optimal Control Theory for Systems with Distributed Parameters.*

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We analyze the inverse problem of breast cancer detection through Electrical Impedance Tomography (EIT). Inverse EIT problem consists in recovering electrical conductivity tensor and potential within the body based on the measurement of the boundary voltages on the electrodes for given electrode current. We consider inverse EIT problem as an optimal control problem for elliptic PDE. Electrical conductivity and boundary voltages are control parameters and the cost functional is L_2 norm declination of the boundary electrode current from given current pattern. We prove the existence of optimal control and Frechet differentiability in the Banach space of bounded measurable matrix functions, and derive the optimality condition. The discretization of the optimal control problem through finite differences is implemented and the convergence of the sequence of discrete optimal control problems to continuous optimal control problem is analyzed. We pursue numerical analysis by implementing projective gradient method in Banach spaces, re-parametrization, Tikhonov regularization and sensitivity analysis with respect to relative size and locations of cancerous tumors. (Received May 26, 2018)