1096-49-2300 **Erin R. Crossen*** (erc7690@rit.edu), 1198 Judge Rd, Basom, NY 14013. *An Equation Error Approach for the Elasticity Imaging Inverse Problem for Predicting Tumor Location.* Preliminary report.

The primary objective of this work is to study the elasticity imaging inverse problem of identifying cancerous tumors in the human body. This nonlinear inverse problem not only represents an important and interesting application, it also brings forth noteworthy mathematical challenges since the underlying model is a system of elasticity equations involving incompressibility. Due to the locking effect, classical finite element methods are not effective for incompressible elasticity equations. Therefore, special treatment is necessary for both the direct and inverse problems. To study the inverse problem in an optimization framework, we propose an extension of the equation error approach. We focus on two cases, namely when the material parameter is sufficiently smooth and when it is may be discontinuous. For the latter case, we extend the total variation regularization method to the elasticity imaging inverse problem. We give existence results for the proposed equation error approach and give convergence analysis for the discretized problem. We give sufficient details on the discrete formulas as well as on the implementation issues. Numerical examples for smooth and discontinuous coefficients are given (Received September 17, 2013)