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B. Jadamba, A. A. Khan, M. Sama and B. Winkler* (bcw9368@rit.edu). *Convex Inversion for Parameter Identification in Saddle Point Problems with an Application to the Inverse Problem of Predicting Tumor Location*. Preliminary report.

In this talk we consider an inverse problem of parameter identification in linear incompressible elasticity with an application to tumor identification within the interior of the human body. We introduce and analyze two new modified output least squares (MOLS) objective functionals with the purpose of studying the inverse problem within the context of optimization. We show the convexity of one of these MOLS functionals, overcoming the general deficiency (non-convexity) of the existing output least squares (OLS) method. From this convexity, we also show that the variational inequality expressing the first-order optimality condition is both necessary and sufficient, again in contrast to OLS, whose corresponding expression only provides a necessary optimality condition. Additional related novel work is presented in the recovery of discontinuous elastic coefficients using total variation regularization along with the results of numerical experiments showing the successful identification of both smooth and discontinuous parameters. (Received September 25, 2012)