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Data inversion in coupled subsurface flow and geomechanics models

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In this talk I present a deterministic inverse modeling approach to estimate subsurface properties by jointly inverting surface deformation and pressure data from a fully-coupled geomechanics-flow (single-phase) model. I discuss key aspects of the analysis of the inverse problem and its regularization. Numerical results of synthetic experiments are displayed to demonstrate the capabilities of the proposed technique for the estimation of petrophysical and elastic properties of the subsurface. In particular, I quantify the added value of measurements of surface deformation in the estimation of absolute permeability with respect to the standard history matching approach of inverting production (e.g. pressure) data with flow models. The main goal of this talk is to show the computational efficiency and robustness of the inverse model which can be potentially used for inverting geodetic measurements (e.g. InSAR and GPS) in combination with production data for optimal monitoring and characterization of the subsurface.