NON-LINEAR DIFFERENCE IMAGING AND TOLERANCE TO MODELLING ERRORS IN ELECTRICAL IMPEDANCE TOMOGRAPHY

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In electrical impedance tomography (EIT), the spatially distributed electrical conductivity of a target is reconstructed based on indirect electrical (current/potential) measurements from its surface. EIT is an example of imaging modalities in which reconstructing an image of the target of interest is an ill-posed inverse problem. This implies that the reconstructions are often highly sensitive to measurement noise and, especially, to modelling errors. In this talk, various examples of uncertainties causing modelling errors in EIT are discussed, and their effects on the reconstructions are demonstrated. Furthermore, alternative approaches to handling modelling errors are discussed – such as estimation of uncertain parameters in the model simultaneously with the conductivity as well as Bayesian approximation error modelling. The special focus of this talk, however, is in so-called non-linear difference imaging – an approach where EIT measurements before and after a change of a time-varying target are utilized to simultaneously reconstruct the conductivity distribution at the initial stage and the change of the conductivity distribution. The results demonstrate that in several applications of EIT particularly the estimates of the conductivity change based on non-linear difference imaging tolerate modelling errors well.