State estimation approach to nonstationary inverse problems

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Abstract

We examine nonstationary inverse problems in which the time evolution of the unknown quantity is modelled by a stochastic partial dierential equation. We consider the prob- lem as a state estimation problem. The time discrete state evolution equation is exact since the solution is given by an analytic semigroup. For the practical reasons the space discretization of the time discrete state estimation system must be performed. However, space discretization causes an error and inverse problems are known to be very intolerant to both measurement errors and errors in models. We analyse the discretization error so that the statistics of the discretization error can be taken into account in the estimation. We are interested in the related ltering problem. A suitable ltering method is presented. We also verify the method using numerical simulation.