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# On the Identification of Nonlinearities in PDE's

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The goal of parameter identification is to indirectly retrieve parameters that appear in partial differential equations from (noisy) data related to the pde-solution, e.g., the solution itself at some specific time, some boundary traces or more complicated functionals. Parameter identification problems belong to the class of inverse problems and are typically ill-posed such that they need to be regularized depending on the quality of the data.

Even if the parameters to be identified are assumed to be constant and the underlying PDE system is linear, the related inverse problem is usually nonlinear. This nonlinearity is strengthened if the parameters are considered as functions of space and/or time and/or the underlying PDE system is nonlinear due to known quantities.

In this talk we consider the nonlinear inverse problem of identifying parameter functions that depend on the PDE solution, the norm of its gradient, , i.e., the underlying PDE system is nonlinear due to unknown quantities. We focus on the application of classical regularization methods to such problems and present numerical results. Eventually, we introduce a method for identifying parameters in dynamical systems simultaneously to the evolution of the latter and pose future challenges.