

# Local Regularization Methods for Nonlinear Volterra Integral Equations of Hammerstein Type

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## Abstract

Local regularization is a generalization of the method developed by J.V. Beck for the inverse heat conduction problem. In this paper, we developed a local regularization theory for the nonlinear Volterra problem of Hammerstein type. Our method retains the causal structure of the original Volterra problem and allows for fast sequential numerical solution. The fundamental difference between our method and the previous existing local regularization method for Hammerstein equations (Lamm and Dai, 2005) is that for our method we do not need to solve a nonlinear equation at every step of a numerical implementation. We only have to solve a nonlinear equation for the first step. We proved the convergence of the regularized solutions to the true solution as noise level in the data shrinks to zero with a certain convergence rate.