THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Convergence Estimates of Inverse Source Problems with Boundary Measurement

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Abstract

In this work, we investigate the Tikhonov-type regularized solutions and their finite element solutions to the inverse space-dependent source problem from boundary measurement data. Firstly, with the classical source condition, we establish the convergence of regularized solutions and their finite element solutions under the standard L^2 norm. The error estimates present explicit dependence on the critical parameters like noise level, regularization parameter, mesh size and time step size. Next, based on our proposed weak norm, we get the conditional stability of Lipschitz type for the inverse problem, then the first order convergence of regularized solutions can be derived in the sense of weak norm. We get this convergence without any source condition. Moreover, this work is further carried out for the scattered data. We suppose the observation points are scattered and the point-wise measurement data come with independent sub-Gaussian random noises. Then we give the stochastic convergence of regularized solutions and propose an efficiently iterative algorithm to determine the optimal regularization parameter. Numerical experiments are presented to demonstrate the effectiveness of the proposed algorithms.

Date:	December 10, 2024 (Thursday)
Time:	10:00am – 11:00am
Venue:	ZOOM: https://hku.zoom.us/j/ Meeting ID: 913 6532 3891 Password: 310656

All are welcome