ABSTRACT

INVERSE PROBLEMS FOR A SEMILINEAR HEAT EQUATIONS WITH MEMORY

Kaya, Müjdat
Ph.D, Department of Mathematics
Supervisor: Prof. Dr. A. Okay Çelebi
Co-Supervisor: Prof. Dr. Varga Kalantarov
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In this thesis, we study the existence and uniqueness of the solutions of the inverse problems to identify the memory kernel k and the source term h, derived from

$$\begin{aligned} \theta_t - k_0\Delta\theta + \int_{-\infty}^{t} k\Delta\theta ds + pg(\theta) &= h, && \Omega\times R^+, \quad \Omega\subset R^n \\ \theta &= 0, && x\in\partial\Omega, \quad t>0 \\ \theta(.,0) &= \theta_0, && x\in\Omega. \end{aligned}$$

First, we obtain the structural stability for k, when p=1 and the coefficient p, when $g(\theta)=\theta$.

To identify the memory kernel, we find an operator equation after employing the half Fourier transformation. For the source term identification, we make use of the direct application of the final overdetermination conditions.

Keywords: Structural stability, inverse problem, final overdetermination condition, memory kernel, source term, Paley-Wiener representation.