Well-posedness of source identification problem for the elliptic equation in a Banach space

Allaberen Ashyralyev[1,2,3,a], Charyyar Ashyralyyev[4,5,b]

[1] Department of Mathematics, Near East University, Nicosia, TRNC, Mersin 10, Turkey
[2] Friendship' University of Russia (RUDN University), Moscow, Russia
[3] Institute of Mathematics and Mathematical Modeling, Almaty, Kazakhstan
[a] allaberen.ashyralyev@neu.edu.tr

[4] Department of Mathematical Engineering, Gumushane University, 29100, Gumushane, Turkey
[5] Department of Computer Technology, TAU, Ashgabat, 744012, Turkmenistan

[b] charyyar@gumushane.edu.tr

Abstract. In the present paper, the source identification elliptic problem

$$\begin{cases} -u''(t) \ + \ Au(t) \ = f(t) \ + \ p, \ 0 < t < T, \\ u'(0) = \varphi, \ u'(T) = \psi, u(\gamma) = \zeta, 0 \le \gamma \le T \end{cases} \quad (1)$$

with a positive operator A in an arbitrary Banach space E is studied. Here smooth function $f : [0,T] \to E$ and elements φ, ψ, ζ are given.

The exact estimates for solution of identification problem are established in Hölder norms. In applications, coercive stability estimates for the solution of three elliptic boundary value problems are obtained.

Keywords: Elliptic equations, source identification, positivity, exact estimates, coercive stability.

2010 Mathematics Subject Classification: 35N25, 35J67.

References

[1] A. Ashyralyev, C. Ashyralyyev, On the problem of determining the parameter of an elliptic equation in a Banach space, Nonlinear Anal. Model. Control **19**(3), 350–366 (2014).

[2] C. Ashyralyyev, G. Akyuz, M. Dedeturk, Approximate solution for an inverse problem of multidimensional elliptic equation with multipoint nonlocal and Neumann boundary conditions, Electronic Journal of Differential Equations **2017**(197), 1-16 (2017).

[3] C. Ashyralyyev, Numerical solution to Bitsadze-Samarskii type elliptic overdetermined multipoint NBVP, Boundary Value Problems, 2017:74 1–22 (2017).