

A note on the nonlocal boundary value problem for a third order partial differential equation

Kheireddine BELAKROUM ¹, Allaberen ASHYRALYEV ², Assia GUEZANE-LAKOUD ³

¹ *Department of Mathematics, Frères Mentouri University, Constantine, Algeria*

E-mail: belakroumkheireddine@yahoo.com

² *Emeritus Professor, Turkey & Turkmenistan*

E-mail: aallaberen@gmail.com

³ *Laboratory of Advanced Materials Mathematics Department, Badji Mokhtar Annaba University, Annaba, Algeria*

E-mail: a_guezane@yahoo.fr

Abstract: It is known that various problem in fluid mechanics (dynamics, electricity) and other areas of physics lead to third order partial differential equations, we derive such equations as models of physical systems and consider methods for solving boundary value problems. This type of equations with constant coefficients can be solved using classical methods like Fourier transform method, and Laplace transform method. In the present study, the nonlocal boundary-value problem for a third order partial differential equation in Hilbert space with a self-adjoint positive definite operator is investigated. Applying operator approach, the theorem on stability for solution of this nonlocal boundary value problem is established. In applications, the stability estimates for the solution of three nonlocal boundary value problems for third order partial differential equations are obtained.

Keywords: Third order partial differential equation, Boundary value problems, Self-adjoint positive definite operator, Hilbert Space.

2010 Mathematics Subject Classification: 34G10, 47N20

REFERENCES

- [1] Yu.P. Apakov, B. Yu. Irgashev, “Boundary-Value Problem for a Degenerate High-Odd-Order Equation“, Ukrainian Mathematical Journal, 2015, Volume 66, Issue 10, pp 1475-1490.
- [2] A. Ashyralyev, N. Aggez, F. Hezenci, “ Boundary value problem for a third order partial differential equation”, AIP Conf. Proc. 1470 (2012) 130-132.
- [3] A. Ashyralyev, P.E. Sobolevskii, New Difference Schemes for Partial Differential Equations, Birkhäuser Verlag, Basel, Boston, Berlin, 2004