J. Adv. Math. Stud.
Vol. **15**(2022), No. 1, 64-70
http://journal.fairpartners.ro

THE SOLUTION OF MIXED TYPE EQUATION WITH A INTEGRAL EQUATION

KHANLAR R. MAMEDOV, VEYSEL KILINÇ AND TURSUN K. YULDASHEV

Abstract. In this paper for mixed hyperbolic-parabolic type equation, a non-local boundary problem with integral boundary condition is studied. Many physical problems are expressed only in mixed-type equations. The physical process is expressed in the hyperbolic type equation in one part of the region and in the parabolic type in the other part. The problem is reduced to the non-local boundary-value problem. In this paper the uniqueness, existence and stability of the solution are shown.

REFERENCES

[1] I.M. Gelfand: *Some questions of analysis and differential equations*, Uspekhi Mat. Nauk, **14**(1959), No. 3(87), 3-19.
[2] Y.S. Uflyand: *Propagation of oscillation in composite electric lines*, Insherno-Fizicheski Zhurnal, **7**(1964), No. 1, 89-82.
[3] O.A. Ladizhenckaya and L. Stupyalis: *On mixed type equations*, Vestnik LGU, Ser. Mat.-Mekh.-Astr., **19**(1965), No. 4, 36-34.
[4] T.D. Dzhuraev: *Boundary value problems for equation of mixed and mixed composite types*, Fan Tashkent, 1979 (in Russian).
[5] A.M. Nachushev: *An a uniqueness condition of the Dirichlet problem for an equation of mixed type in a cylindrical domain,* Differ. Uravn., **6**(1970), No. 1, 192-195 (in Russian).
[6] N. Yu. Kapustin and E.I. Moiseev: *On a spectral problem from the theory of parabolic-hyperbolic heat equations,* Dokl. Ross. Akad. Nauk., **352**(1997), No. 4, 451.
[7] K.B. Sabitov: On the Theory of Mixed-Type Equations, Fizmatlit, Moscow, 2014 (in Russian).
[8] M.A. Sadybekov, G. Dildabek and M.B. Ivanova: *Spectral properties of a Frankl typ e problem for parabolic-hyperbolic equations*, Electron. J. Differential Equations, **65**(2018), 1-11.
[9] T.K. Yuldashev: *Mixed boussines q-type differential equation*, Vestn. Volgogr. Gos. Univ. Ser. Mat-Fiz., **2**(2016), No. 33, 13-23.
[10] K.R. Mamedov: *An Initial boundary value problem for a mixed type equation in a rectangular domain*, Lobachevskii J. Math., **42**(2021), No. 3, 572-578.
[11] T.K. Yuldashev: *Nonlocal mixed-value problem for a Boussines q-type integrodifferential equation with degenerate kernel*, Ukrainian Math. J., **68**(2017), No. 8, 1278-1296.
[12] T.K. Yuldashev and B.J. Kadirkulov: *Nonlocal problem for a mixed type fourth-order differential equation with Hilfer fractional operator*, Ural Math. J., **6**(2020), No. 1, 153-167.
[13] T.K. Yuldashev and B.J. Kadirkulov: *Inverse boundary value problem for a fractional differential equations of mixed type with integral redefinition conditions*, Lobachevskii J. Math., **42**(2021) No. 3, 649-662.
[14] N.I. Ionkin: *Solution of boundary value problem in heat conduction with a nonclassical boundary condition*, Differ. Equ., **13**(1977), No. 2, 294-304.

Received: May 01, 2021. *Revised*: November 12, 2021.
2010 *Mathematics Subject Classification*: 35J05, 35J08, 35J75.
Key words and phrases: Hyperbolic-parabolic type equation, integral boundary condition, uniqueness and existence of solution, stability.

[15] O. Cabri and K.R. Mamedov: *On a nonlocal boundary value problem*, IFSCOM 2016 Proceeding Book, No. 1, (2016), 58-64.
[16] O. Cabri and K.R. Mamedov: *On a social and economic model*, IFSCOM 2016 Proceeding Book, No. 1, (2016), 149-154.
[17] K.B. Sabitov: *Tricomi problem for a mixed parabolic-hyperbolic equation in a rectangular domain*, Mat. Zametki, **86**(2009), No. 2, 273-279.
[18] M.A. Naimark: *Linear Differential Operators*, Part 1, George G. Harrap, New York, 1967.
[19] B.M. Levitan and I.S. Sargsyan: *Introduction of Eigenvalues*, Nauka, Moscov, 1975 (in Russian).

Iğdır University
Faculty of Science and Letter
Math Department
76000, Iğdır, Turkey
E-mail address: hanlar@mersin.edu.tr

Mersin University
Institute of Science
Department of Mathematics
33343, Mersin, Turkey
E-mail address: veysel.kilinc2012@gmail.com

National University of Uzbekistan
Tashkent, Uzbekistan
E-mail address: tursun.k.yuldashev@gmail.com