THE KLEIN-GORDON EQUATION WITH DYNAMIC BOUNDARIES DISSIPATION OF FRACTIONAL DERIVATIVE TYPE

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ABSTRACT. The aim of the paper is to address the fractional derivative-type Klein-Gordon equation with dynamic boundary control. We deduced its well-posedness from linear operator semigroup theory. We evaluate the system's stability using a conclusion drawn by Borichev and Tomilov[8].

REFERENCES

[1] M.Akil, A.Wehbe, *Stabilization of multidimensional wave equation with locally boundary fractional dissipation law under geometric condition*, Math. Control. Relat. Fields.9(1),97-116.(2019).

[2] W. Arendt, C. J. K. Batty, *Tauberian theorems and stability of one-parameter semi-groups*, Trans. Amer. Math. Soc., 306-2, 837-852.(1988).

[3] C. J. K.Batty, R.Chill, and Y.Tomilov, *Fine scales of decay of operator semigroups*, J. Eur. Math. Soc.303 (JEMS), 18(4), 853-929.(2016).

[4] C. J. K.Batty, and T.Duyckaerts, *Non-uniform stability for bounded semi-groups on Banach spaces*, J. Evol. Equ., 8(4), 765-780.(2008).

[5] A. Benaissa and H. Benkhedda, *Global existence and energy decay of solutions to a wave equation with a dynamic boundary dissipation of fractional derivative type*, Z. Anal. Anwend. 37, no. 3, 315—339.(2018).

[6] A. Benaissa and S.Rafa, *Well-posedness and energy decay of solutions to a wave equation with a general boundary control of diffusive type*, Mathematische Nachrichten, 292(8),1644-1673.(2019).

[7] E.Blanc, G.Chiavassa and B.Lombard, *Biot-JKD model: Simulation of 1D transient poroelastic waves with fractional derivatives.* J. Comput. Phys., 237, 1-20.(2013).

[8] A.Borichev, and Y.Tomilov, *Optimal polynomial decay of functions and operator semigroups*, Math. Ann.,301 347(2), 455-478.(2010).

[9] J. U.Choi, and R. C.Maccamy, *Fractional order Volterra equations with applications to elasticity.* J. Math. Anal. Appl. 139, 448-464.(1989).

[10] R. Jaime Muñoz, V. Poblete and O. Vera, *Stability for an Klein-Gordon equation type with a boundary dissipation of fractional derivative type.* Asymptot. Anal. 127 (2022), 249–273. (2022).

[11] A.Haraux, and T.Cazenave, *An introduction to semilinear evolution equations*, Oxford Lecture Series in Mathematics and its Applications 13. (1998).

[12] I. Lyubich Yu and Q. P. Vu, *Asymptotic stability of linear differential equations in Banach spaces*, Studia Math. 88-1, 37-42.(1988).

[13] B. Mbodje, *Wave energy decay under fractional derivative controls*, IMA J. Math. Control Inform., 23, 237-257. (2006).

[14] J. Pruss, *On the spectrum of C_0-semigroups*, Trans. Amer. Math. Soc. 2, 847-857.(1984).

[15] J.Rozendaal, D.Seifert and R.Stahn, *Optimal rates of decay for operator semigroups on Hilbert spaces*, Adv. Math., 346, 359-388.(2019).

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