

A note on hyperbolic differential equations on manifold

Allaberen Ashyralyev¹, Yasar Sozen², Fatih Hezenci³

¹ *Department of Mathematics, Near East University, Nicosia, TRNC,
Mersin 10, Turkey,*

*Peoples' Friendship University of Russia (RUDN University), Ul Miklukho
Maklaya 6, Moscow 117198, Russia, and*

*Institute of Mathematics and Mathematical Modeling, 050010, Almaty,
Kazakhstan*

allaberen.ashyralyev@neu.edu.tr

² *Department of Mathematics, Hacettepe University, 06800, Ankara, Turkey*

ysozen@hacettepe.edu.tr

² *Department of Mathematics, Duzce University, 81620, Duzce, Turkey*

fatihhezenci@duzce.edu.tr

Abstract: The well-posedness of nonlocal boundary value problems for partial differential equations of hyperbolic type has been studied extensively (see, e.g. [1–4] and the references therein).

The present abstract investigates the differential equations on smooth closed manifolds and considers the well-posedness of boundary value problem for hyperbolic equations in Hölder spaces. Moreover, it is established new coercivity estimates in various Hölder norms for the solutions of such boundary value problems for hyperbolic equations.

Keywords: Differential equations on manifolds, well-posedness, self-adjoint positive definite operator

2010 Mathematics Subject Classification: 58Jxx, 58J32, 58J99

REFERENCES

- [1] A. Ashyralyev and P. E. Sobolevskii, *New Difference Schemes for Partial Differential Equations*, Birkhäuser, 2004.
- [2] A. Ashyralyev and P. E. Sobolevskii, Two new approaches for construction of the high order of accuracy difference schemes for hyperbolic differential equations, *Discrete Dyn. Nat. Soc.*, vol. 2, 183–213 (2005).
- [3] H. O. Fattorini, *Second Order Linear Differential Equations in Banach Space*, Elsevier Science, 1985.
- [4] Ph. Clement and S. Guerre-Delabrière, On the regularity of abstract Cauchy problems and boundary value problems, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. Lincei (9) Mat. Appl.*, vol. 9, 245–266 (1999).