

Solution of Initial Value Problems with Monogenic Initial Functions in Banach Spaces with L_p -Norm

Uğur Yüksel

Abstract. This paper deals with the initial value problem of the type

$$\frac{\partial u(t, x)}{\partial t} = \mathcal{L}u(t, x), \quad u(0, x) = u_0(x) \quad (0.1)$$

in Banach spaces with L_p -norm, where t is the time, u_0 is a monogenic function and the operator \mathcal{L} is of the form

$$\mathcal{L}u(t, x) := \sum_{A, B, i} C_{B, i}^{(A)}(t, x) \frac{\partial u_B(t, x)}{\partial x_i} e_A. \quad (0.2)$$

The desired function $u(t, x) = \sum_B u_B(t, x) e_B$ defined in $[0, T] \times \Omega \subset \mathbb{R}_0^+ \times \mathbb{R}^{n+1}$ is a CLIFFORD-Algebra-valued function with real-valued components $u_B(t, x)$. We give sufficient conditions on the coefficients of the operator \mathcal{L} under which \mathcal{L} is associated to the CAUCHY-RIEMANN operator \mathcal{D} of CLIFFORD-ANALYSIS. For such operator \mathcal{L} the initial value problem (0.1) is solvable for an arbitrary monogenic initial function u_0 and the solution is also monogenic for each t .

Mathematics Subject Classification (2000). Primary 35F10; Secondary 30G35.

Keywords. Initial value problems, monogenic functions, scales of Banach spaces.

Uğur Yüksel
Atılım University
06836 Ankara
Turkey
e-mail: uyuksel@atilim.edu.tr

Received: March 06, 2008

Accepted: July 04, 2008