Capacity and Non-linear Potential in Musielak-Orlicz Spaces

M.C. Hassib [1*], Y. Akdim [2], A. Benkirane [3] and N. Aissaoui [4]

[1] *Faculty of science and technique, University Sidi Mohamed Ben Abdellah, P.O. Box 2202, road of Imouzzer Fez, Laboratory : LSI, Taza, Morocco.*
[2] *Faculty poly-disciplinary of Taza, Laboratory : LSI, Morocco.*
[3] *Faculty of Sciences Dhar El Mahraz, Laboratory LAMA, University Sidi Mohamed Ben Abdellah, P.O. Box 1796, Atlas Fez, Morocco.*
[4] *Ecole normale supérieure, P.O. Box 5206 Bensouda Fez, Morocco.*

Abstract: In this paper we are going to introduce the theory of capacity in Musielak-Orlicz space. We will define the $C_{k,\varphi}$ capacity and the $D_{k,\varphi}$ capacity, prove their main properties, and establish relationship between $C_{k,\varphi}$ and $D_{k,\varphi}$. We shall introduce the theory of non-linear potential and give some of its properties.

Keywords: *Musielak-Orlicz space; Radon measures space; capacity; potential.*

Mathematics Subject Classification (2010): 31C15.

Introduction

The theory of capacity and non-linear potential in the Lebesgue space L^p studied by Maz'ya and Khavin in [10] and Meyers in [11] introduced the concept of capacity and non-linear potential in these spaces and provided very rich applications in functional analysis, harmonic analysis and the theory of partial differential equations. The previous concept was generalised by N. Aissaoui and A. Benkirane in [2] and [3], by replacing L^p by Orlicz space.

The main purpose of this paper is to study the theory of capacity and non-linear potential in Musielak-Orlicz space. Our results generalize those of N. Aissaoui and A. Benkirane in the case of Orlicz spaces [see [3] and [2]]. Let us note that this generalization was touched upon by Fumi-Yuki Maeda, Yoshihiro Mizuta, Takao Ohno and Tetsu Shimomura in [9] [see the third paragraph], but we are going to deal with another method.

---

* Corresponding author: mailto:cherif_hassib@yahoo.fr