

Chapter 6: Spectral Properties of Positive Linear Operators under Relatively Uniform Convergence with Respect to Orlicz Function

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Abstract: In this paper, we study the spectral behavior of positive linear operators acting on Orlicz spaces within the framework of relatively uniform convergence. By employing the modular structure induced by an Orlicz function, we establish spectral inclusion results, the existence of positive eigenvectors, and the structure of the peripheral spectrum. A Kreĭn–Rutman type theorem is developed under relatively uniform convergence, extending classical results in Banach lattices to the Orlicz setting. Applications to integral and Markov operators are also provided

Keywords: Spectral radius; Positive operator; Relative uniform convergence; Orlicz space; Kreĭn–Rutman theorem; Peripheral spectrum.

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1. Introduction

The spectrum of positive linear operator plays a significant rule in functional analysis as well as applied mathematics. Some of the classical theorem such as Kreĭn–Rutman [25] and thus of Peron–Frobinies provided deeper insides in the spectral analysis and probability theory adopts function spaces which extend the beyond classical spaces. One of the notables such spaces is that of Orlicz spaces which offer a flexible and strong framework govern by an Orlicz function.

The concept of relative uniform convergence was first introduced by Moore [19] in 1910. Later on, Chittenden [3, 4, 5] refined the concept of the relative uniform convergence with respect to scale function. Several researchers studied in different aspects like Dimirci et al. [10, 11] studied the approximation theorem of statistically relative uniform convergence of functions, while Dimirci and Orhan [9, 21] examined a statistical version of relative uniform convergence of positive linear operators. Sahin and Dirik [22, 23], analyzed the statistical relative uniform convergence of double sequences of positive linear operators. Devi and Tripathy [12, 13] studied relative uniform convergence of double sequences of functions.