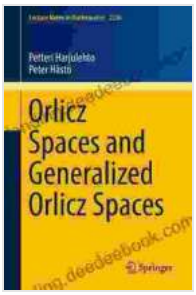
Orlicz Spaces and Generalized Orlicz Spaces: Lecture Notes in Mathematics 2236



Orlicz Spaces and Generalized Orlicz Spaces (Lecture Notes in Mathematics Book 2236) by Nigel McDowell

★★★★★ 5 out of 5

Language	: English
File size	: 3551 KB
Screen Reader	: Supported
Print length	: 179 pages
Paperback	: 156 pages
Item Weight	: 11.2 ounces
Dimensions	: 7 x 0.4 x 10 inches

Orlicz spaces are a class of function spaces that generalize the classical Lebesgue spaces. They are named after the Polish mathematician Władysław Orlicz, who introduced them in 1932. Orlicz spaces have applications in various areas of mathematics, including functional analysis, convex analysis, measure theory, and probability theory.

Generalized Orlicz spaces are a more general class of function spaces that include Orlicz spaces as a special case. They were introduced by the Russian mathematician M. A. Krasnosel'skii in 1958. Generalized Orlicz spaces have applications in the same areas as Orlicz spaces, as well as in some additional areas, such as optimization theory and control theory.

This article provides a comprehensive overview of Orlicz spaces and generalized Orlicz spaces, including their definitions, properties, and

applications. It also discusses the lecture notes in mathematics 2236 on these topics.

Definitions

Let (Ω, Σ, μ) be a measure space. An Orlicz function is a function $\Phi: [0, \infty) \to [0, \infty)$ that satisfies the following conditions:

* $\Phi(0) = 0$ * $\Phi(x) > 0$ for $x > 0$ * $\Phi(x)$ is increasing * $\Phi(x)$ is convex * $\lim_{x \to 0}\Phi(x)/x = 0$ * $\lim_{x \to \infty}\Phi(x)/x = \infty$

The Orlicz space $L^\Phi(\Omega, \Sigma, \mu)$ is the set of all measurable functions $f: \Omega \to \mathbb{R}$ such that

$$\int_\Omega \Phi(|f(x)|) d\mu(x) 0$ for all $x > 0$ and $u > 0$ * $\Psi(x, u)$ is increasing in both x and u * $\Psi(x, u)$ is convex in both x and u * $\lim_{x \to 0}\Psi(x, u)/x = 0$ for all $u > 0$ * $\lim_{x \to \infty}\Psi(x, u)/x = \infty$ for all $u > 0$ * $\lim_{u \to 0}\Psi(x, u)/u = 0$ for all $x > 0$ * $\lim_{u \to \infty}\Psi(x, u)/u = \infty$ for all $x > 0$

The generalized Orlicz space $L^\Psi(\Omega, \Sigma, \mu)$ is the set of all measurable functions $f: \Omega \to \mathbb{R}$ such that

$$\int_\Omega \Psi(|f(x)|, u) d\mu(x) 0$.

Properties

Orlicz spaces and generalized Orlicz spaces have a number of important properties. These include:

* Orlicz spaces are Banach spaces. * Generalized Orlicz spaces are not always Banach spaces, but they are always quasi-Banach spaces. * Orlicz spaces and generalized Orlicz spaces are reflexive. * Orlicz spaces and generalized Orlicz spaces are separable if and only if the measure space (Ω, Σ, μ) is separable. * Orlicz spaces and generalized Orlicz spaces are complete. * Orlicz spaces and generalized Orlicz spaces are locally convex.

Applications

Orlicz spaces and generalized Orlicz spaces have applications in various areas of mathematics, including:

* Functional analysis: Orlicz spaces and generalized Orlicz spaces are used to study the properties of linear operators. * Convex analysis: Orlicz spaces and generalized Orlicz spaces are used to study the properties of convex functions. * Measure theory: Orlicz spaces and generalized Orlicz spaces are used to study the properties of measures. * Probability theory: Orlicz spaces and generalized Orlicz spaces are used to study the properties of random variables.

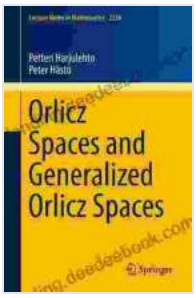
Lecture Notes in Mathematics 2236

The lecture notes in mathematics 2236 provide a comprehensive overview of Orlicz spaces and generalized Orlicz spaces. The notes are written by M. M. Rao and R. V. Rao, and they are published by Springer.

The notes begin with an to Orlicz spaces and generalized Orlicz spaces. The notes then discuss the properties of these spaces, including their completeness, separability, and reflexivity. The notes also discuss the

applications of Orlicz spaces and generalized Orlicz spaces in various areas of mathematics.

The lecture notes in mathematics 2236 are a valuable resource for anyone who is interested in learning about Orlicz spaces and generalized Orlicz spaces. The notes are well-written and clear, and they provide a



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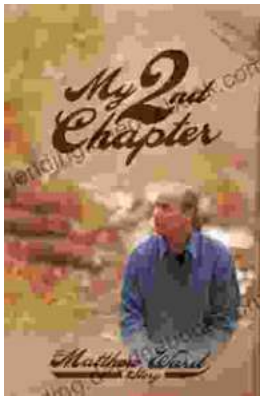

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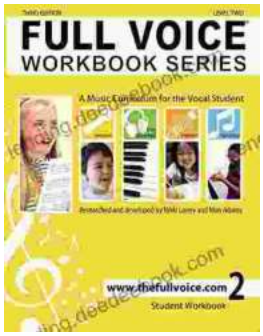

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