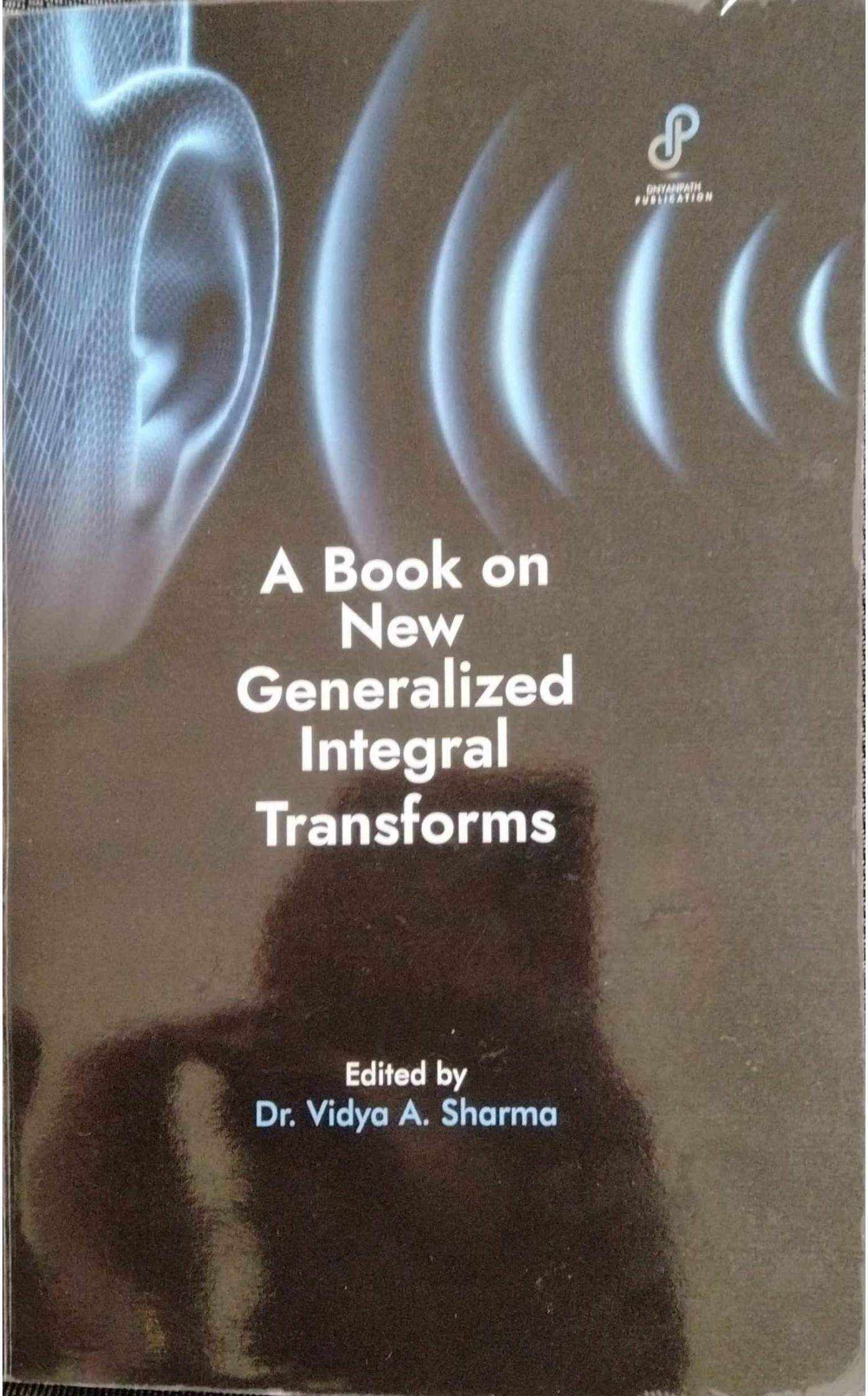

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Edited by
Dr. Vidya A. Sharma

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-I N D E X-

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Chapter One

Curvelet Analysis of Optical Solitons and its Energy Aspects

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Abstract :

In this study Curvelet theory is applied to analyze the solitons arising as the solutions of Non-linear Schrodinger Equation (NLSE) which represents the behaviour of optical soliton in an optical fiber. New version of Curvelet transform (CT) in L^2 frame which makes use of soliton solution as its Analyzing curvelets is proposed. It is shown that the application of new Analyzing curvelets is very useful for Curvelet transform analysis of soliton interaction. Formulations of solitons as curvelets, reconstruction formula for soliton are obtained. Energy distribution in Curvelet transform domain are discussed.

Keywords :

Wavelet Transform, Curvelet Transform, Discrete curvelet transform, Non-linear Schrodinger Equation, Solitons.

1. Introduction :

Wavelet based multi-resolution techniques have been widely used in image/signal processing, biological and computer vision, scientific computing, optical data analysis. For example, applications of wavelet transform have been explored in analyzing solitons [3], bio-informatics [2], neural networks [1] and many more. Since Olshausen and Field's work in Nature [6], researchers in biological vision have discussed the similarity between vision and multi-scale image processing. However, wavelets do not provide good direction selectivity, which is also an important response property of simple cells and neurons at stages of the visual pathway. To overcome this limitation, through several attempts, significant progress in the development of directional wavelets has been made in recent years. In 1999, an anisotropic geometric wavelet