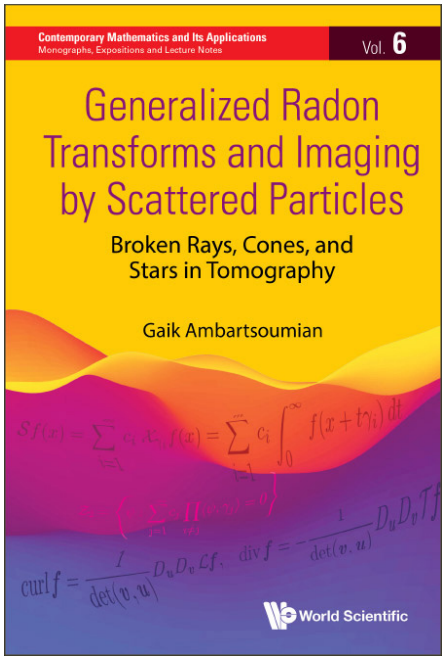
Generalized Radon Transforms and Imaging by Scattered Particles

Broken Rays, Cones, and Stars in Tomography



By: Gaik Ambartsoumian
(*The University of Texas at Arlington, USA*)

ISBN 9789811242434
Extent: 248pp, HB
Pub Date: 2023
Price: US$88
Subject: Mathematics

ABOUT THE BOOK

A generalized Radon transform (GRT) maps a function to its weighted integrals along a family of curves or surfaces. Such operators appear in mathematical models of various imaging modalities. The GRTs integrating along smooth curves and surfaces (lines, planes, circles, spheres, amongst others) have been studied at great lengths for decades, but relatively little attention has been paid to transforms integrating along non-smooth trajectories. Recently, an interesting new class of GRTs emerged at the forefront of research in integral geometry. The two common features of these transforms are the presence of a "vertex" in their paths of integration (broken rays, cones, and stars) and their relation to imaging techniques based on physics of scattered particles (Compton camera imaging, single scattering tomography, etc).

This book covers the relevant imaging modalities, their mathematical models, and the related GRTs. The discussion of the latter comprises a thorough exploration of their known mathematical properties, including injectivity, inversion, range description and microlocal analysis. The mathematical background required for reading most of the book is at the level of an advanced undergraduate student, which should make its content attractive for a large audience of specialists interested in imaging. Mathematicians may appreciate certain parts of the theory that are particularly elegant with connections to functional analysis, PDEs and algebraic geometry.

READERSHIP

Advanced undergraduate and graduate students, mathematicians, engineers and physicists interested in mathematical models of image reconstruction using scattered particles.

CONTENTS

ABOUT THE AUTHOR

Gaik Ambartsoumian received his Diploma in applied mathematics from Obninsk Institute of Nuclear Power Engineering (Russia) in 2001, and his PhD in mathematics from Texas A&M University in 2006. Since 2006, he has been on the faculty of the Department of Mathematics, University of Texas at Arlington, where he is currently an Associate Professor. He has also held adjunct or visiting positions at the American University of Armenia in Yerevan (Armenia), Centre for Applicable Mathematics at Tata Institute of Fundamental Research in Bangalore (India), UT Southwestern Medical Center in Dallas, TX, Mathematical Sciences Research Institute in Berkeley, CA, and Applied Science Laboratory at GE Healthcare in Milwaukee, WI. His research projects have been funded by the National Science Foundation, the National Institutes of Health, US Department of Defence, the Simons Foundation, and Texas Higher Education Coordinating Board.

Dr Ambartsoumian's scientific interests focus on computerized tomography, integral geometry, inverse problems, and mathematical methods of imaging. His prior work has been dedicated to mathematical problems related to thermoacoustic and photoacoustic tomography, near-field ultrasound tomography, radars and sonar imaging. The recent emphasis of his research includes the study of generalized Radon transforms arising in single-scattering tomography, Compton camera imaging, and positron emission tomography.

For orders and enquiries, please contact us:

FEEL Books

FEELBOOKS PVT. LTD. www.feelbooks.in

DELHI	4381/4 Ansari Road, Daryaganj, New Delhi 110002		**Tel:** +91-11-47472630
	Pushpendra Kumar	**Mobile:** +91 9015043442	**Email:** orders@feelbooks.in
BENGALURU	C-22, Brigade MM, KR Road, Jayanagar 7th Block, Bengaluru 560070		**Tel:** +91-80-26762129
	Shekar Reddy	**Mobile:** +91 9945234476	**Email:** bangalore@feelbooks.in
MUMBAI	Alok Dube	**Mobile:** +91 9833435804	**Email:** adube@feelbooks.in
CHENNAI	G Srinivasan	**Mobile:** +91 9003047502	**Email:** gsrinivasan@feelbooks.in
KOLKATA	Dhrubajyoti Bhattacharjee	**Mobile:** +91 9836160013	**Email:** dbhattacharjee@feelbooks.in
HYDERABAD	Kundan Kumar.S	**Mobile:** +91 8106726072	**Email:** kundan@feelbooks.in

For any queries, please email us at marketing@feelbooks.in