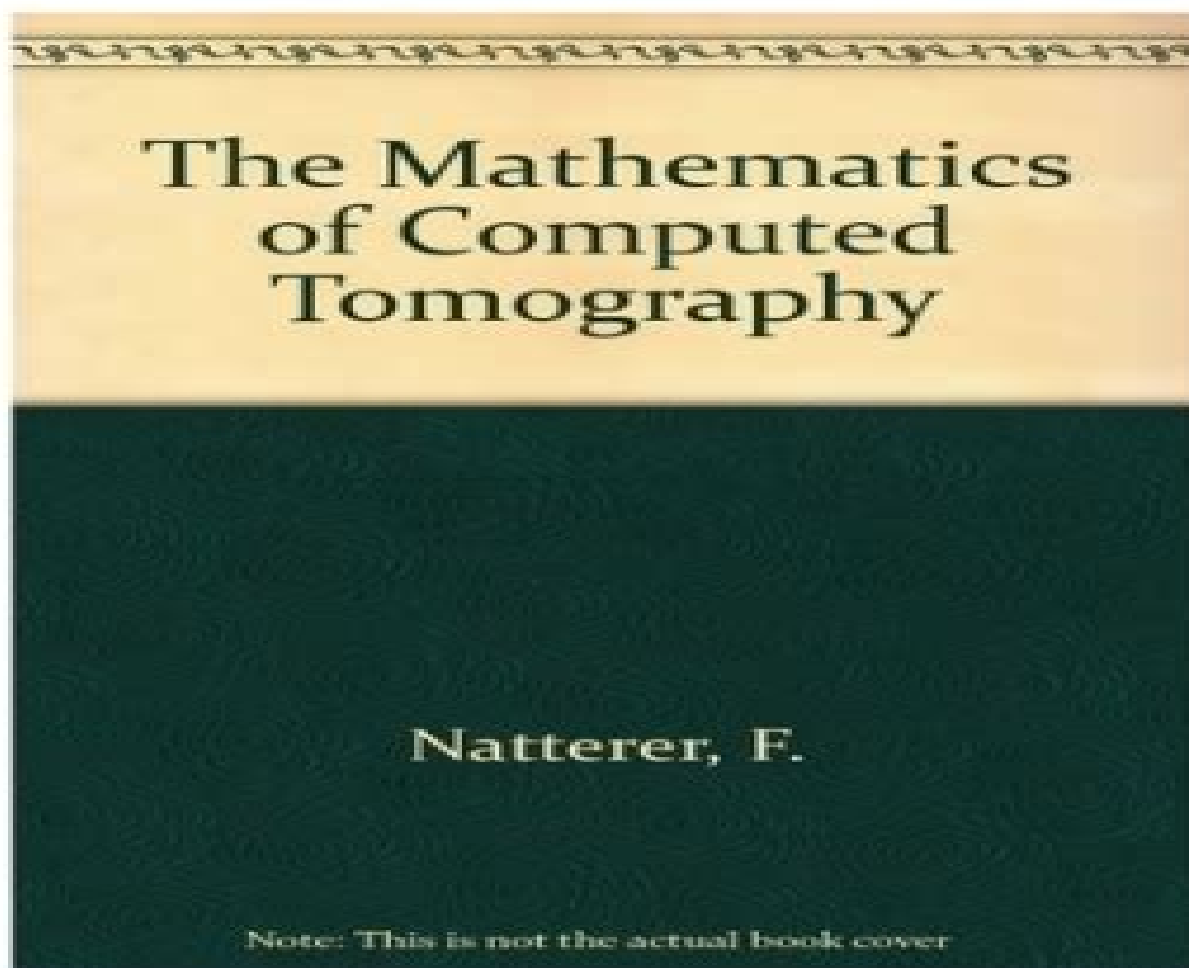


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Michael Hoelscher



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4226 Ridge Lea Road Amherst N Y 14226 USA In August 1978 we have attended a working conference on Computer Aided Tomography and Ultrasonics in Medicine which was held in Haifa Israel under the auspices of the International Federation for Information Processing 1 That meeting in common with other meetings relating to computerized tomography concentrated on the physical engineering and clinical aspects of the topic with little attention paid to the underlying mathematics and no attention paid to recent developments in mathematics inspired by computerized tomography although not necessarily useful for computerized tomography We both felt that it would be worthwhile to organize a meeting of mathematicians which would concentrate on the mathematical aspects of computerized tomography This volume and the meeting on which it is based is the outcome of our decision in August 1978 to attempt to bring together such a meeting In the meantime much has been published on the topic of computerized tomography Fundamentals of Computerized Tomography Gabor T. Herman, 2009-07-14 This revised and updated second edition now with two new chapters is the only book to give a comprehensive overview of computer algorithms for image reconstruction It covers the fundamentals of computerized tomography including all the computational and mathematical procedures underlying data collection image reconstruction and image display Among the new topics covered are spiral CT fully 3D positron emission tomography the linogram mode of backprojection and state of the art 3D imaging results It also includes two new chapters on comparative statistical evaluation of the 2D reconstruction algorithms and alternative approaches to image reconstruction **Computed Tomography** Per Christian Hansen, Jakob Jorgensen, William R. B. Lionheart, 2021-09-25 This book describes fundamental computational methods for image reconstruction in computed tomography CT with a focus on a pedagogical presentation of these methods and their underlying concepts Insights into the advantages limitations and theoretical and computational aspects of the methods are included giving a balanced presentation that allows readers to understand and implement CT reconstruction algorithms Unique in its emphasis on the interplay between modeling computing and algorithm development Computed Tomography Algorithms Insight and Just Enough Theory develops the mathematical and computational aspects of three main classes of reconstruction methods classical filtered back projection algebraic iterative methods and variational methods based on nonlinear numerical optimization algorithms It spotlights the link between CT and numerical methods which is rarely discussed in current literature and describes the effects of incomplete data using both microlocal analysis and singular value decomposition SVD This book sets the stage for further exploration of CT algorithms Readers will be able to grasp the underlying mathematical models to motivate and derive the basic principles of CT reconstruction and will gain basic understanding of fundamental computational challenges of CT such as the influence of noisy and incomplete data as well as the reconstruction capabilities and the convergence of the iterative algorithms Exercises using MATLAB are included allowing readers to experiment with the algorithms and making the book suitable for teaching and self study Computed Tomography Algorithms Insight and Just Enough Theory is primarily aimed at students researchers and practitioners

interested in the computational aspects of X ray CT and is also relevant for anyone working with other forms of tomography such as neutron and electron tomography that share the same mathematical formulation With its basis in lecture notes developed for a PhD course it is appropriate as a textbook for courses on computational methods for X ray CT and computational methods for inverse problems *Image Reconstruction from Projections* Gabor T. Herman, 1980 Image reconstruction from projections Probability and random variables An overview of the process of CT Physical problems associated with data collection in CT Computer simulation of data collection in CT Data collection and reconstruction of the head phantom under various assumptions Basic concepts of reconstruction algorithms Backprojection Convolution method for parallel beams Other transform methods for parallel beams Convolution methods for divergent beams The algebraic reconstruction techniques Quadratic optimization methods Noniterative series expansion methods Truly three dimensional reconstruction Three dimensional display of organs Mathematical background

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