DOWNLOAD PDF AXIAL CIRCULAR TRANSFORMATIONS

Chapter 1 : "Circular Cylinder In Axial Flow" by Stephen P. Sawchuk

The concluding Chapter 5 considers a more sophisticated type of mapping: axial circular transformations, more commonly known as Laguerre transformations. Some authors refer to the group of these transformations as the extended Laguerre group.

 Abstract Reconstruction algorithms for circular cone-beam CB scans have been extensively studied in the literature. Since insufficient data are measured, an exact reconstruction is impossible for such a geometry. If the reconstruction algorithm assumes zeros for the missing data, such as the standard FDK algorithm, a major type of resulting CB artifacts is the intensity drop along the axial direction. Many algorithms have been proposed to improve image quality when faced with this problem of data missing; however, development of an effective and computationally efficient algorithm remains a major challenge. In this work, we propose a novel method for estimating the unmeasured data and reducing the intensity drop artifacts. Assuming the CB projection is taken from a parallel beam geometry, we extract those data that reside in the unmeasured region of the Radon space. More approximations are then made on the calculation of the additional term, and the final formula is implemented very efficiently. The algorithm performance is evaluated using computer simulations on analytical phantoms. The reconstruction comparison with results using other existing algorithms shows that the proposed algorithm achieves a superior performance on the reduction of axial intensity drop artifacts with a high computation efficiency. Many approximate reconstruction algorithms have been proposed in the literature. The FDK algorithm, developed by Feldkamp et al. Although originally derived as a heuristic extension of the exact fan-beam reconstruction, the FDK algorithm has been shown to be equivalent to an exact 3D reconstruction if the unmeasured Radon space data are assumed zeros [3 , 4], except that a small correction term is also needed [5 , 6]. Therefore, the FDK algorithm is exact for an object with uniform distribution in the longitudinal direction [2], whose Radon space data the first derivative of the Radon transform are exactly zeros in the unmeasured region of a circular trajectory. However, in general, zero is not a good approximation of the missing Radon space data, for the case when the scanned object is nonuniform and compactly supported, and has nonnegative attenuation coefficients. Consequently, the reconstructed images have CB artifacts, such as the well-known intensity drop in the axial direction [2 , 5 , 7 â€" 10]. The reconstruction can be improved by using an auxiliary trajectory in addition to the circular trajectory to measure the missing data [11 â€" 13]. In this work, we focus on using circular trajectories only, and develop an estimation-based method to reduce the intensity drop artifacts. Reduction of artifacts in circular cone-beam CT CBCT can be achieved by estimating the unmeasured data using interpolation or extrapolation. However, this method requires three-dimensional 3D data gridding, and hence it is computationally intensive; and in addition the backprojection structure is lost. Estimation methods of the Radon space data are also proposed in the space of reconstructed images, using multiple scans with different source-to-axis distances [7 , 14 , 15]. These algorithms require either multiple reconstructions using different imaging geometric parameters or an iterative reconstruction that involves several computationally intense forward and backprojection steps. Hu discovered that in a circular CB trajectory, the original object can be written as the summation of three terms [5]: Hu proposed an algorithm that includes the first two measured terms, which shows reduced intensity drop in the reconstruction as compared to the FDK reconstruction [5]. However, the formula of the estimated term takes the form of shift-variant filtering and backprojection, two steps that both require intense computation. However, the derivation of estimation formula for is different from that of Yang, and the resulting implementation of the final formula is very efficient. Then, the unmeasured Radon space data are estimated from the CB projection by assuming that the projection is acquired in a parallel beam geometry. This approximation is equivalent to a data interpolation in the Radon domain. The estimated data are reconstructed as in the parallel beam geometry. More approximations are made to avoid the expensive steps of shift-variant filtering and backprojection in the calculation. To fully evaluate the algorithm, the reconstructions are also compared with those using other existing algorithms. The rest of this paper is organized as follows. The main algorithm is then derived and a reconstruction scheme is also proposed. Section 3 presents the results of computer simulations. Finally, Section 4 summarizes the paper. The System Geometry The system geometry is shown in Figure 1. In this paper, we use an equally spaced flat panel detector with a finite size. Algorithms when other types of detectors are used can be derived similarly. During data acquisition, the X-ray source rotates about the plane, with a fixed distance to the center of rotation. Angle is the full fan angle determined by the size of the detector and the focal spot to detector distance. We derive the algorithm assuming that the range of the view angle is degrees in a full-scan mode. The detector is placed perpendicular to for each projection. The object to be reconstructed is described by a compactly supported nonnegative function , where is the Cartesian coordinate. In the derivation, it is also assumed that there is no truncation of the projection data; this condition, however, will be relaxed based on the final formula. CB data acquisition geometry and coordinate system. Denoting the distance from , the relationship between , the real projection image, and , the image on a virtual detector that is parallel to the real detector and passes through , is as follows: Main variables used in this paper are listed in Table 1 for clarity. However, it is not efficient to directly use the Radon inversion on the X-ray projection data. To reduce the computational complexity, Grangeat established a fundamental relationship between the X-ray projection image and the first derivative of the Radon transform of the scanned object. One line on the projection image can be specified by two parameters, its distance to the origin , and the vector in the image plane and perpendicular to.

Chapter 2 : Strain Transformation by Mohr Circle | Mechanics of Materials

The text then takes a look at circular transformations and circular geometry, including ordinary circular transformations, axial circular transformations of the Lobachevskii plane, circular transformations of the Lobachevskii plane, axial circular transformations, and ordinary circular transformations.

Chapter 3 : Strain Transformation by Mohr Circle | Mechanics of Materials

This book is the concluding Part IV of Geometric Transformations, but it can be studied independently of Parts I, II, and III, which appeared in this series as Volumes 8, 21, and

Chapter 4 : Directional statistics - Wikipedia

affine transformations apply an inversion axial circular transformations axial inversion takes center of inversion center of similarity central line centrally similar circle E circle or line circle passing circles perpendicular circles S2 circles Si circles tangent circumscribed coincides common tangents concentric circles corresponds cross.

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10) Circle G is in plain strain with principal strains 1 and 2 as and micro, respectively. The maximum shear strain is.

Chapter 6 : An Efficient Estimation Method for Reducing the Axial Intensity Drop in Circular Cone-Beam CT

Abstract The boundary layer formed on the outer surface of a semi-infinite circular cylinder in steady axial incompressible flow is studied in this thesis.

Chapter 7 : Cylindrical coordinate system - Wikipedia

The experiments were performed using crossed magnetic fields, which were the vector sum (H âˆ‘) of axial (H AX) and circular (H CIRC) magnetic fields (see Fig. 1). An electric current I flowing through the wire was used to produce the *circular magnetic field, H CIRC.*

Chapter 8 : "Circular Cylinder In Axial Flow" by Stephen P. Sawchuk

1 Chapter 7 Analysis of Stresses and Strains Introduction axial load " = P / A torsional load in circular shaft $ = T!/ Ip bending moment and shear force in beam.

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The Design and Fabrication of Low Speed Axial-Flow Compressor Blades by Joukowski Transformation of a Circle Chigbo A. Mgbemene Department of Mechanical Engineering, University of Nigeria, Nsukka.