# ALTERNATIVE MISALIGNMENT DETECTION IN X-RAY CONE-BEAM MICROTOMOGRAPHY

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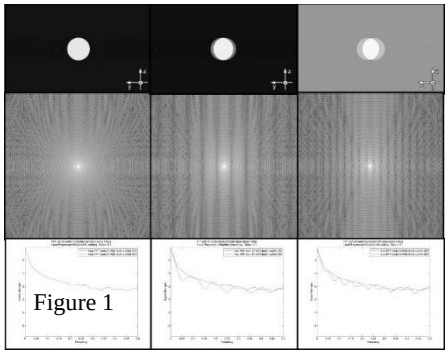
Generally, cone-beam tomography requires seven major parameters in order to acquire 2D reconstruction slice image or 3D volume reconstruction [1]. A misleading value of any parameters may cause an undesired result of reconstruction, which is due to a misaligned system of CT especially with a flat-panel detector. In conventional approaches, calibration phantom equipped with markers made by metals or highly absorbed materials has been introduced to handle for the issue. For instance, a four-point marker phantom is placed each on a vertex of a square sample with an object. These four point will use their position to obtain detector parameters and to realign system for reconstruction results [2]. Although these approaches yield pretty good results in a millimeter-scale system, it is hard to implement such approaches in a range of micrometer or smaller. We propose an alternative method to detect misalignment of a cone-beam microtomography. Instead of analyzing data in a spatial domain, this approach introduces a method to retrieve geometrical misalignment information from a frequency domain. The idea is that each misaligned parameter will show its unique pattern reflecting on a reconstruction image. A responding pattern defines a value of misaligned parameter and its accuracy measures in a pixel scale which could greatly benefit to microtomography.



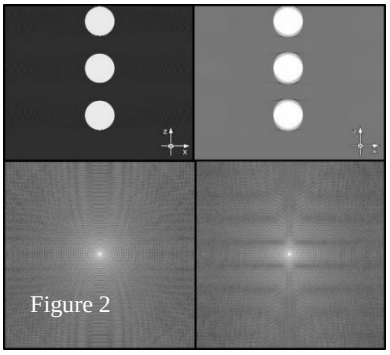




Figure 1: (top) Simulated reconstruction images of metal ball with horizontal center misaligned parameter of 0, 5 and 10 pixels. (middle) Magnitude of 2D Fourier transform of reconstruction images. (bottom) Magnitude plot of (b) in 0 degree showing trace of misalignment. Figure 2: (top) Reconstruction images of metal ball phantom with vertical center misaligned parameter of 0, 40 pixels. (middle) Magnitude of 2D Fourier transform of reconstruction images.

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