

Recent Developments on the X-ray Phase Contrast Imaging and CT in BSRF

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Abstract

Since 2001 hard x-ray phase contrast imaging and computer tomography (CT) methods have been developed at the Beijing synchrotron radiation facility (BSRF). The most recent advancements of these imaging methods are reported below:

1. A model discussing the mechanism of imaging of cylinder-like structures in inline phase contrast imaging has been proposed. Cylinder-like structures are present in many biological and medical samples, and the correlation among contrast, radius, refraction index difference, distance between sample and detector and spatial coherence of the source have been included in this model.
2. The main parameters of the diffraction enhanced imaging (DEI) equation were investigated, the influence of small angle scattering accepted by the analyzer crystal on imaging is discussed and the term to describe the influence was introduced into DEI equation, some results were given in this contribution.
3. The condition for phase contrast CT has been carefully investigated. In particular we demonstrated that the projection of the function to be reconstructed can not be described as a simple line integral along the x-ray path, and in addition this function has to be rotational invariant. An example of the refraction index gradient of CT is discussed in this manuscript.

The new instrumentation is operative at BSRF for users for both phase contrast imaging and CT experiments. Recent experimental results will be presented and discussed.