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3D Quantitative Nanoscale Imaging via Coherent X-Rays[1] KEVIN RAINES, CHANGYONG SONG, HUAIDONG JIANG, ADRIAN MANCUSCO, RUI XU, JIANWEI MIAO, Department of Physics and Astronomy, University of California, Los Angeles, CA 90095, CHIEN-CHUN CHEN, TING-KUO LEE, Institute of Physics, Academia Sinica, Nankang, Taipei, 11529, Taiwan, TETSUYA ISHIKAWA, RIKEN SPring-8 Center, 1-1-1, Kouto, Sayo, Hyogo 679-5148, Japan — Coherent x-ray diffraction microscopy (CXDM) promises to become an important imaging technique, particularly with the development of FELs. Indeed, recently there has been much interest in harnessing CXDM to quantitatively image in 3D such biological samples as single cells, organelles, and eventually macromolecules. Such images are obtained by rotating a specimen about an axis, resulting in its 3D diffraction pattern in cylindrical coordinates. Thus interpolating the data accurately onto a Cartesian grid is an essential step to 3D image reconstruction. I have developed a gridding-based interpolation scheme that yields a superior reconstruction from a limited and incomplete set of diffraction patterns. This interpolation algorithm is generalizable to a variety of imaging and interpolation applications. The effect of various degrees of angular under-sampling and the missing wedge upon resolution in each dimension will also be discussed.

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