A Computational Forward Model for Propagation-Based Phase Contrast CT in a Cone-beam Geometry

MAYO CLINIC

CT Clinical Innovation Center

New forward model for cone-beam paraxial wave propagation: cone-beam beam propagation method (**cbBPM**)

sample volume

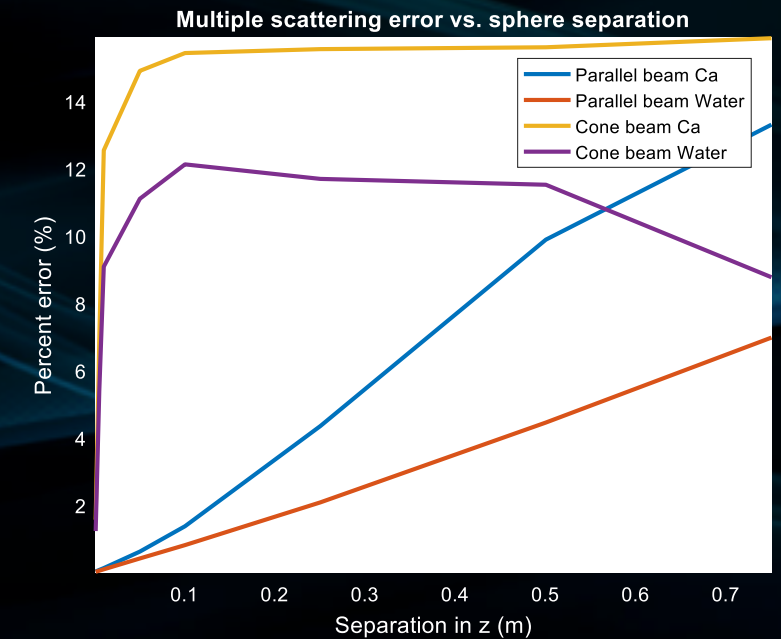*propagation axis **z***

δz
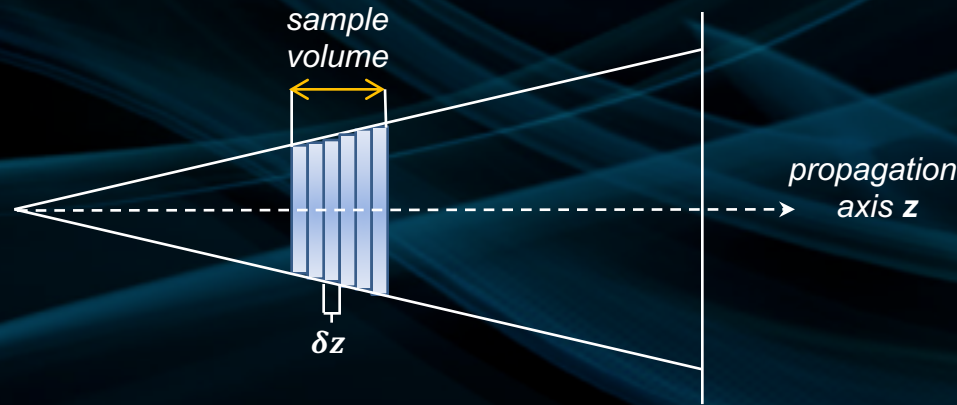
Features of cbBPM
- Multiple scattering
- Cone beam effects
- Computationally efficient

Example of multiple scattering problem solved with BPM compared to the Mie-Schafer solution (gold standard)

Scattering from 3 displaced cylinders
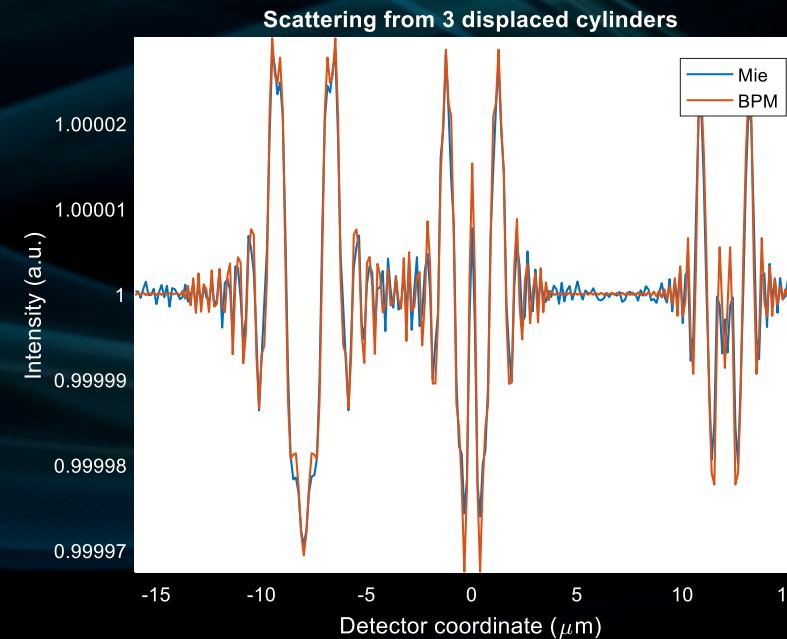
Error between the two methods is less than 2×10^{-4} % and computation time of BPM is over **250x faster**

Errors caused by the projection approximation become significant in phase imaging

Multiple scattering error vs. sphere separation

cbBPM allows modeling beyond thin, weakly scattering samples; crucial for clinical CT

Elisabeth Shanblatt - Emerging and Preclinical Modalities - Sunday July 29, 2018 at 4:50 PM