

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Medical Applications of X-Ray Phase Contrast Imaging

CHRISTOPH ROSE-PETRUCK, CHRISTOPHER LAPERLE, THERON HAMILTON, GUOHUA CAO, PHILIP WINTERMEYER, GERALD DIEBOLD, JACK WANDS, Brown University — We report the use of an inline holographic x-ray imaging technique for medical purposes. In contrast to conventional x-ray radiography a phase-sensitive x-ray imaging method is employed. This phase-contrast x-ray imaging is fundamentally different from conventional x-ray shadowgraphy because the mechanism of image formation does not rely on differential absorption by tissues. Instead, x-ray beams undergo differential phase shifts in passing through an organ and subsequently interfere constructively or destructively at the x-ray camera. Hence, tissues are distinguished by their different indices of refraction rather than their absorptive properties. This imaging method is more than a thousand times more sensitive to density variations of tissues than conventional absorption methods and enables imaging of soft tissues with high contrast without the use of contrast agents. For example, we will present images of mouse livers yielding resolution of arterial capillaries as small as tens of micrometers. We also show the imaging technique operates in combination with ultrasound-induced, tissue-selective, differential movement of cancer tumors which highlights the tumor of interest and in some cases obviates the need for chemical contrasting agents.

Christoph Rose-Petruck
Brown University

Date submitted: 21 Nov 2006

Electronic form version 1.4