Non-contact Approaches and Surface Reconstruction in Optical Tomography

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Abstract

Optical imaging and tomography in tissues can facilitate the quantitative study of several important chromophores and fluorophores n-vivo. Due to this fact, there has been great interest in developing imaging systems offering quantitative information on the location and concentration of chromophores and fluorescent probes. However, most imaging systems currently used in research make use of fiber technology for delivery and detection, which restricts the size of the photon collecting arrays leading to insufficient spatial sampling and field of view. To enable large data sets and full 360o angular measurements, we developed an imaging system that enables 3D imaging of fluorescent signals in bodies of arbitrary shapes in a non-contact geometry in combination with a 3D surface reconstruction algorithm. The system is appropriate for in-vivo small animal imaging of fluorescent probes. The system consists of a rotating sample holder and a lens coupled CCD camera in combination with a fiber coupled scanning device. The methodology involved will be presented, together with preliminary in-vivo results.