

Reflectance Optical Tomography in Epithelial Tissues

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We will discuss direct and inverse problems for light propagation in layered tissues. Light propagation in tissues is governed by the theory of radiative transport. This theory takes into account absorption and scattering due to inhomogeneities. A two-layer halfspace is a useful tissue model because it allows one to prescribe different optical properties in superficial and deep regions of tissues. This difference between optical properties is necessary to model accurately light propagation through tissues systems comprised of a thin cellular epithelial layer supported by an underlying stroma. We discuss an inverse obstacle scattering problem in layered tissues with applications to detecting carcinomas in situ. This theory makes explicit use of the fact that there exists angular diversity in backscattered light measurements.