Radiative transport theory for optical molecular imaging

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Technological advances in the chemical sciences have provided the means for designing fluorescent molecules that seek out and tag specific cellular targets. Upon being excited by an external light source at a specific wavelength, these fluorescent molecules re-emit light at a longer wavelength. Hence, these markers act as internal sources that can be imaged from measurements at the tissue surface. This optical imaging technology offers great potential for detecting cellular and structural changes associated with predisease states. In this talk, we study the inverse fluorescent source problem for optical molecular imaging. By analyzing the governing radiative transport equation, we develop an algorithm that determines the location, size and strength of the fluorescent source in a half-space composed of a uniform absorbing and scattering tissue.