Radiative transfer in light based tomography

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There is an increasing interest in developing tomographic imaging modalities based on visible or near-infrared light. This interest in utilising light in biomedical imaging arises from benefits of light based modalities: sensitivity to tissue oxygenation, simple and low-cost instrumentation, non-invasive nature and usage of non-ionising radiation. Examples of such techniques include, for example, diffuse optical tomography, fluorescence optical tomography and (quantitative) photoacoustic tomography. Image reconstruction in tomographic imaging modalities is an ill-posed inverse problem. Solution of such problem requires accurate solution of the forward model describing physics of the imaging situation. Conventionally, optical tomographic techniques rely on simplified models for light propagation in tissue, such as diffusion approximation or modifications of the Beer-Lambert law. However, a more accurate model of light propagation in these imaging situations is the radiative transfer equation. In this talk, I give a short review on light based tomographic methods and modelling aspects related to these techniques. Furthermore, I briefly tell about the work that we have done in Kuopio regarding this topic.