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Impact of finite sample dimensions on calculated reflectance and transmittance of thin turbid samples: numerical comparisons of Monte Carlo vs. Adding-Doubling VINOIN DEVPAUL VINCELY, KARTHIK VISHWANATH, Miami University — Accurate estimations of wavelength-dependent scattering and absorption coefficients are needed to describe photon propagation in multiply-scattering media. Experimentally measured reflectance and transmittance are fit by theoretical photon-migration models to estimate sample optical properties. Modeled solutions to the equation of radiative transport (RTE) (or its approximation such as diffusion theory) express the measured quantities as functions of the optical properties of the sample. The adding doubling (AD) algorithm is a commonly used method that reduces the RTE to one-dimension (1-D), to calculate solutions. For this 1-D approximation to be valid, samples are modelled to have infinite extent in two spatial dimensions (orthogonal to the incident beam direction). Experimentally this condition may not be valid, especially for large beam diameters. Alternatively, 3D photon migration dictated by RTE can be directly simulated using Monte-Carlo (MC) methods. Here, we compare total reflectance and transmittance of samples with varying optical properties and finite spatial dimensions obtained from MC to AD predictions.

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