Experimental studies of laser light scattering in turbid media

SAWYER CAMPBELL, RAINER GROBE, CHARLES SU, Intense Laser Physics Theory Unit and Department of Physics, Illinois State University, Normal, IL 61790-4560 — We inject an angularly collimated laser beam into a scattering medium of a non-dairy creamer-water solution and examine the distribution of the scattered light along the optical axis as a function of the source-detector spacing. The experimental and simulated data obtained from a Monte Carlo simulation on the optical axis suggest four regimes characterizing the transition from un-scattered to diffusive light. We compare the data with theoretical predictions based on a first-order scattering theory for regions close to the source, and with diffusion-like theories for larger source-detector spacings. We comment on the impact of the measurement on the light distribution and show that the regime of validity of these theories can depend on the experimental parameters such as the diameter and acceptance angle of the detection fiber.

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