Current progress in computational imitation of radiative transfer: from simple light to complex vector laser beams

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Based on the comparison of the iteration procedure of the solution of Bethe-Salpeter equation and the Monte Carlo method, a unified computational method for imitation of radiative transfer in complex tissue-like turbid medium has been developed. The developed approach is comprehensively validated and verified against diffusing theory, exact Milne solution, alternative theoretical models and the results of experimental studies. It has been demonstrated that the developed computational technique is able not just simulate, but imitate the results of actual experiments. The technique was generalized and extensively used in major applications in biophotonics and biomedical imaging, and since recently actively utilized for new sensors design. Current presentation comprises a brief description of the background of the approach, and shows the examples of the results, including simulation of coherent effects of multiple scattering of laser radiation, such as enhancement of Coherent Back-Scattering (CBS) and temporal intensity fluctuation of polarized laser radiation scattered within the random inhomogeneous turbid medium, modeling of circularly polarized light propagation in biological tissues and pilot results of imitation of angular momentum of light (Laguerre-Gaussian twisted or structured light) transfer in turbid tissue-like scattering medium.