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## **Statistical electromagnetics**

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While it is recognized that the Maxwell equations control the transport of electromagnetic energy in macroscopic particulate and heterogeneous media, direct computer solutions of the Maxwell equations for such media had been impracticable until quite recently. This has led to a widespread use of the phenomenological radiative transfer equation and heuristic effective-medium approximations in situations when their very applicability can be questioned. This situation is now changing owing to the availability of efficient computer solvers of the Maxwell equations applicable to macroscopic multi-particle groups. In fact, a new branch of statistical electromagnetics has emerged wherein the scattering of light (and other electromagnetic radiation) by discrete and discretely heterogeneous random media is modeled directly by using numerically exact computer solutions of the Maxwell equations. In this review we summarize these recent developments and discuss how they establish a mesoscopic bridge between the macrophysical regime of radiative transfer, weak localization, and effective-medium approximations on one hand and the microphysical regime of Maxwell's electromagnetics on the other.