Efficiency and validity of the superposition *T*-matrix method: recent advances

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With growing computing hardware capabilities, full-wave simulations of light propagation in macroscopic aggregated media like powders, paint, or scattering layers in optoelectronic thin-film devices are becoming feasible [1]. To this end, half-spaces or laterally infinite slabs of discrete random media are approximated with scattering samples comprising finite, but very large, numbers of particles [2]. This approach poses substantial challenges to current implementations of the superposition T-matrix method (STMM), as the numerical effort grows rapidly with the particle number.

Another challenge for the STMM is the adaption to a broader range of scattering configurations, including densely packed non-spherical particles as well as flattened particles close to infinite interfaces. Here, care has to be taken with respect to the validity of the employed field representations in the near-field zone of the particles [3].

After an introduction to the general formalism, this talk will focus on the computational bottlenecks, and review strategies for efficient implementations of the STMM. We will also cover recent approaches to extend the validity of multiple-scattering calculations to configurations where the circumscribing sphere of a particle is intersected by either another particle or by a planar interface [4,5].

References

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