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Comprehensive thematic *T*-matrix reference database: A 2013–2014 update

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ABSTRACT

This paper is the sixth update to the comprehensive thematic database of peer-reviewed *T*-matrix publications initiated by us in 2004 and includes relevant publications that have appeared since 2013. It also lists several earlier publications not incorporated in the original database and previous updates.

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1. Introduction

The comprehensive database of *T*-matrix publications was initiated in 2004 [1] and was followed by five updates [2–6]. This sixth update lists 152 new publications as Refs. [7–158]. Most of them have appeared since 2013 with the exception a few publications omitted inadvertently in Refs. [1–6]. As before, the present update is compiled by applying four general restrictions:

- The database contains only publications dealing with electromagnetic scattering.
- In general, publications on scattering by isolated infinite cylinders and systems of parallel infinite cylinders in unbounded space are excluded.
- Publications on the Lorenz–Mie theory and its various extensions to individual isotropic, spherically symmetric scatterers are not, generally, included.
- The database contains only references to books, peer-reviewed book chapters, and peer-reviewed journal papers, while conference proceedings and theses are not covered.

Furthermore, we continue to use the following operational definition of the *T*-matrix method:

> In the framework of the *T*-matrix method, the incident and scattered electric fields are expanded in series of suitable vector spherical wave functions; the relation between the columns of the respective expansion coefficients is established by means of a transition matrix (or *T* matrix). This concept applies to the entire scatterer or to separate parts of a composite scatterer.

As such, this definition encompasses what is often referred to as the multi-sphere method or the generalized Lorenz–Mie theory. As usual, the practical value of this database is enhanced by classifying all references into a set of narrower subject categories. The inclusion of a publication in our

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database does not constitute any formal endorsement or quality certification on our part.

Despite the above-defined “filters”, this update contains too many publications to make practicable a critical overview of all recent advances. However, a few publications deserve to be mentioned specifically. Ref. [98] describes an extension of the superposition *T*-matrix method to arbitrarily clustered and nested spherical domains with non-overlapping boundaries. The correspoding computer program is publicly available on-line and is likely to dramatically expand the range of electromagnetic scattering problems that can be addressed by directly solving the Maxwell equations. Ref. [102] is a state-of-the-art textbook on electromagneti scattering by particles and particle groups. Ref. [103] is the Chinese translation of the monograph on *Scattering, Absorption, and Emission of Light by Small Particles* first published by Cambridge University Press in 2002. Finally, Ref. [120] is the second edition of the popular text on *Electromagnetic Wave Scattering on Nonspherical Particles* which has been thoroughly updated, describes a useful and representative software package, and contains a new chapter on scattering by particles lacking axial symmetry.

As always, we would very much appreciate e-mailing us missing references as well as information on recently published books, book chapters, and peer-reviewed journal papers for inclusion in a forthcoming update of this reference database.

2. Particles in infinite homogeneous space

2.1. Books and reviews
[78,79,83,102,103,120,129]

2.2. Mathematics of the *T*-matrix method
[120,129]

2.3. Extended boundary condition method and its modifications, generalizations, and alternatives
[18,49,82,84,120]

2.4. *T*-matrix theory and computations for anisotropic, chiral, gyrotropic, magnetic, and charged scatterers
[32,71,98,110,144]

2.5. Multi-sphere and superposition *T*-matrix methods and their modifications, including related mathematical tools
[21,98,129,132,158]

2.6. *T*-matrix theory and computations of electromagnetic scattering by periodic and aperiodic configurations of particles and photonic crystals
[27,31,32,59,111,115,129,149]

2.7. *T*-matrix theory and computations of electromagnetic scattering by discrete random media and particulate surfaces
[38,42,115,138,143]

2.8. Relation of the *T*-matrix method to other theoretical approaches [82]

2.9. Symmetry properties of the *T* matrix, analytical ensemble-averaging approaches, and linearization
[18,116,129]

2.10. Software implementation, parallelization, GPU-acceleration, and customization of *T*-matrix computer programs
[18,87,120]

2.11. Convergence of various implementations of the *T*-matrix method
[18,49]

2.12. *T*-matrix calculations for homogeneous spheroids
[8–10,18–20,26,28,33,34,37,39,40,46,47,56–58,61,62,64,66,72,74,85,90,91,96,97,99,106,112,114,-117,119–121,125,132,134,135,140,141,148,157]

2.13. *T*-matrix calculations for Chebyshev and generalized Chebyshev particles
[47,120]

2.14. *T*-matrix calculations for finite circular cylinders
[18,24,47,56,63,120,128,132,145]

2.15. *T*-matrix calculations for various rotationally symmetric particles
[16,79,80,81,150–152]

2.16. *T*-matrix calculations for ellipsoids, polyhedral scatterers, and other particles lacking axial symmetry
[17,116]

2.17. *T*-matrix calculations for layered and composite particles
[18,140]

2.18. *T*-matrix calculations for clusters of homogeneous and core–mantle spheres
[13,21–23,25,29,30,45,47,48,50,53,65,67,68,76,77,79,86,89,92,93,95,100,107,108,110,111,113,118,124,1-26,127,130,133,137,139,142,143,146,147,154,155]

2.19. *T*-matrix calculations for clusters of nonspherical, inhomogeneous, and optically active monomers
[17,41,67–69,98,109,132,153]

2.20. *T*-matrix calculations for particles with one or multiple (eccentric) inclusions
[17,18,104,105]

2.21. *T*-matrix calculations of optical resonances in nonspherical particles
[53,54,81,104]

2.22. *T*-matrix calculations of optical and photophoretic forces and torques on small particles
[24,137,156]

2.23. *T*-matrix calculations of internal, surface, and local fields and near-field energy exchange
[98]

2.24. Illumination by focused beams and non-plane waves
[25,137]

2.25. Use of *T*-matrix calculations for testing other theoretical techniques
[13,16,77,93–95,106,108,114,126,127,133]

2.26. Use of *T*-matrix calculations for analyzing laboratory and in situ data
[9,33,39,55,64,113,139,151,152]

2.27. *T*-matrix modeling of scattering properties of mineral aerosols in the terrestrial atmosphere and soil particles
[9,10,34,37,40,64,72,85,91,99,117,119,121,135,148]

2.28. *T*-matrix modeling of scattering properties of carbonaceous and soot aerosols and soot-containing aerosol and cloud particles
[30,47,93,105,118,127,133,147,154]

2.29. *T*-matrix modeling of scattering properties of cirrus cloud particles
[15,17,96,145,157]

2.30. *T*-matrix modeling of scattering properties of hydrometeors and atmospheric radar targets
[7,8,11,12,19,23,26,35,36,51,56,57,61,70,73,74,75,90,-95,112,123,136,140,141]
2.31. *T*-matrix modeling of scattering properties of stratospheric and noctilucent cloud particles
[28,46,62,66,97]
2.32. *T*-matrix modeling of scattering properties of aerosol and cloud particles in planetary atmospheres
[76]
2.33. *T*-matrix modeling of scattering properties of interstellar, interplanetary, cometary, and planetary-ring particles
[110,125]
2.34. *T*-matrix computations for biomedical applications
[16,81,86,100,109,128]
2.35. *T*-matrix computations of anisotropic and aggregation properties of colloids and other disperse media
[41,48,101,130,139,146]

3. Particles near infinite interfaces

[43,44,60,88,156]

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