



# Plasmon Resonances in Nanoparticles (World Scientific Series in Nanoscience and Nanotechnology)

*Isaak D Mayergoyz*

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Isaak D Mayergoyz

## Plasmon Resonances in Nanoparticles (World Scientific Series in Nanoscience and Nanotechnology)

Isaak D Mayergoyz

This unique volume provides a broad introduction to plasmon resonances in nanoparticles and their novel applications. Here, plasmon resonances are treated as an eigenvalue problem for specific boundary integral equations and general physical properties of plasmon spectrum are studied in detail. The coupling of incident radiation to specific plasmon modes, the time dynamics of their excitation and dephasing are also analytically treated. Finally, the applications of plasmon resonances to SERS, light controllability (gating) of plasmon resonances in semiconductor nanoparticles, the use of plasmon resonances in thermally assisted magnetic recording (TAMR), as well as in all-optical magnetic recording and for enhancement of magneto-optic effects are presented.

### Contents:

#### • *Introduction:*

- What are Plasmon Resonances?
- Dispersion Relations
- Overview of Book Contents

#### • *Modal Analysis of Plasmon Resonances in Nanoparticles:*

- Plasmon Resonances as an Eigenvalue Problem
- Dual Formulation
- General Properties of Plasmon Spectrum
- Plasmon Resonances in Nanoshells
- Relation to the Riemann Hypothesis

#### • *Analytical and Numerical Analysis of Plasmon Resonances:*

- Some Analytical Solutions for Plasmon Modes
- Numerical Techniques for the Analysis of Plasmon Modes
- Numerical Examples
- Universal Numerical Technique for the Solution of Boundary Integral Equations
- Absorbing Boundary Conditions for Finite-Difference Time-Domain Analysis of Scattering Problems

#### • *Radiation Corrections, Excitation of Plasmon Modes and Selective Applications:*

- Perturbation Technique
- First- and Second-Order Radiation Corrections
- Analysis of Extinction Cross Section
- Coupling of Plasmon Modes to Incident Radiation, Time-Dynamics of Their Excitation and Dephasing
- Selective Applications of Plasmon Resonances

**Readership:** Graduate students and researchers in plasmon resonances in nanoparticles.

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