Maxwell equations applied to Mie scattering theory

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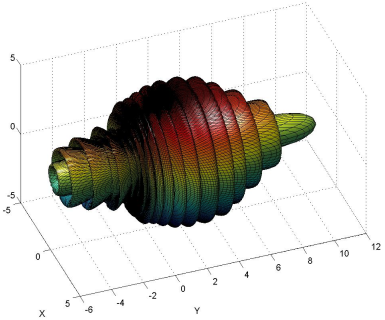
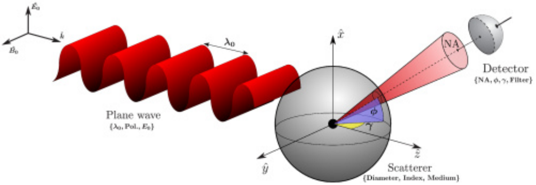
24th of Mars

Mie scattering theory





Objectives

- Learn to use feel++ CFPDE
- Create a simple model to simulate Mie theory.
- improve incrementaly the model

Maxwell equations

$$\text{div}(\vec{E}) = \frac{\rho}{\epsilon_0}$$

(Maxwell-Gauss)

$$\vec{\text{rot}}\,(\vec{E}) = -\frac{\partial \vec{B}}{\partial t}$$

(Maxwell-Faraday)

$$\text{div}(\vec{B}) = 0$$

(Maxwell-Flux)

$$\vec{\text{rot}}\,(\vec{B}) = \mu_0 \vec{J} + \frac{1}{c^2}\frac{\partial \vec{E}}{\partial t}$$

(Maxwell-Ampère)

Modeling incrementation

- 1 wave 1 particle
- 2D / 3D
- non spherical particle
- multiple particles/waves

Tools

1. Feel++
   - Coefficient forms in PDE (Partial Differential Equation)
   - $$\frac{\partial u}{\partial t} + \nabla \cdot (-c\nabla u - \alpha u + \gamma) + \beta \cdot \nabla u + au = f \text{ dans } \Omega$$
2. gmsh
3. Paraview

Biblio

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