AiryElements

AiryElements Software Capabilities

Description: For realistic models for the design and analysis of polarizers and retarders. The **AiryElements** polarization ray tracing engine will refract, reflect, and total internally reflect rays through dichroic (sheet), crystal, and wire grid polarizers as well as crystal retarders and retarding prisms.

Applications: Waveplates, achromatic waveplates, crystal polarizers, wire grid polarizers, Wollaston prisms, Glan-Taylor and Glan-Thompson polarizers, walk-off plates, Lyot filters, arbitrary crystal polyhedra, gem stones, etc.

Capabilities and Features: **AiryElements** base package includes modeling of anisotropic materials (quartz, calcite, sapphire, etc) and rigorous coupled wave analysis (RCWA) for grating and holographic optical elements. Thus detailed models of wire grid and dichroic polarizers and crystal assemblies and retarders are analyzed for their wavelength and angle dependence. Surfaces can be uncoated, have multilayer coatings, or be perfect coatings (ideal, lossless, non-polarizing).

The **RCWA** calculates complex amplitude coefficients and diffraction efficiencies for isotropic gratings and handles out-of-plane rays, conical diffraction. The RCWA models for wire grid polarizers and other diffractive optical elements are not limited to the weak-coupling regime of Kogelnik theory or restricted to angles near the Bragg condition.

The **polarization ray tracing** performs automated ray doubling, dividing beams at beamsplitters and interfaces, and can trace in sequential and non-sequential modes. Non-sequential ray tracing can calculate the contributions of multiple reflections. All ray intercept calculations include 3D polarization ray tracing matrices and Mueller matrices. Includes a **materials library** of common glasses and crystals and their principal refractive indices as functions of wavelength; user defined materials and dispersion equations can be added. Plotting routines render optical systems and rays with 3D polarization viewing.

Mathematica: Requires Wolfram Research's *Mathematica*®. All quantities can be further manipulated within *Mathematica* for flexible operation.

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