Fall 2017

Mathematical Sciences/ RTG Seminar

"Adaptive Higher-Order Finite Element Simulations for the Time-Harmonic Maxwell Equations"

In the terahertz frequency range, the effective (complex-valued) surface conductivity of atomically thick 2D materials such as graphene has a positive imaginary part that is considerably larger than the real part. This feature allows for the propagation of slowly decaying electromagnetic waves, called surface plasmon-polaritons (SPPs), that are confined near the material interface with wavelengths much shorter than the wavelength of the free-space radiation. SPPs are promising ingredients in the design of novel optical applications promising "subwavelength optics" beyond the diffraction limit. There is a compelling need for controllable numerical schemes which, placed on firm mathematical grounds, can reliably describe SPPs in a variety of geometries.

In this talk we present a higher-order finite element approach for the simulation of SPP structures on a conducting sheet, excited by a plane-wave or electric Hertzian dipole sources. Aspects of the numerical treatment such as absorbing, perfectly matched layers, local refinement and a-posteriori error control are discussed. Corresponding analytical results are briefly presented as well.

Speaker: Matthias Maier

(University of Minnesota)

Monday, October 23, 2017

Time: 4:00 – 5:00 PM

Location: AE214

Refreshments: 3:30 – 4:00 PM, AE 4th Floor Lounge

Rensselaer

Host: David Wells