Mathematics, Statistics, and Computer Science **@ UIC**

Analysis and Applied Mathematics Seminar

Simulation of Optical Phenomena on 2D Material Devices

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Abstract: 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 a promising ingredient in the design of novel optical devices, 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 number of analytical and computational approaches to simulate SPPs on 2D material interfaces and layered heterostructures. Aspects of the numerical treatment such as absorbing perfectly matched layers, local refinement and a-posteriori error control are discussed. We show analytical results for some prototypical geometries and a homogenization theory for layered heterostructures.

Monday, October 14 at 4:00 PM in 636 SEO