

# Dallas IEEE Photonics Society Symposium on Open-Source Computational Electromagnetics

**Date:** Wednesday November 16<sup>th</sup>, 2016

**Time:** 9am-5pm, Central Daylight Time

**Location:** Room 604 Nedderman Hall, [University of Texas at Arlington](#), 416 S. Yates St., Arlington, TX 76010

**Format:** multiple sessions; [schedule](#)

**Registration:** via email to [info@simpetuscloud.com](mailto:info@simpetuscloud.com) by Monday November 14<sup>th</sup>

**Cost:** Free & Open to the Public

**Flyer:** [link](#)

## Abstract

The Dallas IEEE Photonics Society is hosting a symposium on computational electromagnetics based on popular open-source simulation tools. Interactive, hands-on sessions will introduce participants to setting up and launching electromagnetic simulations using state-of-the-art software packages originally developed at MIT: differential-equation solvers [MEEP](#) (finite-difference time-domain) and [MPB](#) (frequency-domain planewave expansion). This suite of simulation tools supports a wide range of electromagnetic design and modeling.

Participants are required to bring their laptops and will be guided through several tutorial examples involving (1) preparing simulation models, (2) deploying them using high-performance computing (HPC) via Amazon Web Services (AWS) [Elastic Compute Cloud](#) (EC2), and (3) post-processing the results using [Octave](#). The examples will be based on topics relevant to current research. Also, the instructor will be available for private consultation after the workshop to further assist participants with the simulation tools.

## Instructor

[Ardavan Oskooi](#) is the Founder and CEO of [Simpetus](#), a San Francisco-based startup with a mission to propel simulations forward with open source and cloud computing. Ardavan received his Sc.D. from MIT where he worked with Professors Steven G. Johnson and John D. Joannopoulos (thesis: Computation & Design for

Nanophotonics) to develop [MEEP](#). Ardavan has published 13 first-author articles in peer-reviewed journals and a book [Advances in FDTD Computational Electrodynamics: Photonics and Nanotechnology](#) with Professors Allen Taflove of Northwestern University and Steven G. Johnson. He has a masters in Computation for Design and Optimization from MIT and completed his undergraduate studies, with honors, in Engineering Science at the University of Toronto. Prior to launching Simpetus, Ardavan worked with Professors Susumu Noda at Kyoto University and Stephen R. Forrest at the University of Michigan on leveraging MEEP to push the frontier of optoelectronic device design.

**Faculty Host:** Prof. [Robert Magnusson](#), Department of Electrical Engineering, University of Texas at Arlington

**Organizer:** Dr. [Alexander Umnov](#), Dallas IEEE Photonics Society & Corning Inc.

## Open-Source Computational Electromagnetics Symposium Schedule

**Wednesday Nov. 16<sup>th</sup>, 2016**

### **9-10:15am**

Overview of finite-difference time-domain (FDTD) and introduction to MEEP. Summary of steps involved in running MEEP calculations. Transmission through a waveguide bend as a first example.

### **10:15-10:30am**

Coffee Break

### **10:30-11:15am**

Real-world tutorial examples, Part 1: *Light Trapping in Nanostructured Thin Films* — Materials with arbitrary, complex refractive indices  
— Obliquely-incident planewave sources

### **11:15am-12:00pm**

Real-world tutorial examples, Part 2: *Far-Field Diffraction of Binary Gratings* — Near-to-far-field transformation  
— Visualization of field propagation

**12:00-1:30pm**

Lunch

**1:30-3:00pm**

Real-world tutorial examples, Part 3: *Spontaneous-Emission Enhancement Rate and Light-Extraction Efficiency of Organic Light-Emitting Diodes* —Incoherent emission from dipole excitons based on Monte-Carlo methods

—Surface-plasmon polaritons (SPP)

—Parallelization of large computational volumes

**3:00-3:15pm**

Coffee Break

**3:15-3:45pm**

Overview of spectral methods and introduction to MPB. Summary of steps involved in running MPB calculations.

**3:45-4:15pm**

Real-world tutorial examples, Part 4: *Band Diagram of Silicon-on-Insulator (SOI) Waveguides* — Strip and rib waveguides

— Identification of guided and radiative modes

**4:15-5:00pm**

Tying up loose ends; open-ended question-and-answer session; individual consultations.