

Best Practices in EM Simulation in COMSOL Multiphysics®

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Abstract

This session addresses some common challenges in electromagnetic modeling and simulation. The introductory presentation will cover how to pick and choose between a large number of available formulations in three separate modules including the AC/DC Module, RF Module, and Wave Optics Module. Examples are discussed from wave propagation modeling to low frequency modeling.

Topics covered include:

- Traps and pitfalls when modeling open boundaries in wave propagation. For example, how to deal with surface plasmon propagation along media interfaces. Leiming Wang from Konica Minolta will talk more about this later in the session.
- How to define voltage and ground in inductive modeling and how these relate to their counterparts in circuit modeling.
- Why closed form solutions sometimes give rise to artifacts when used as input to numerical models.
- When initial conditions become important in electromagnetic modeling. One example is modeling a permanently polarized device such as a permanent magnet. Another example, presented by Yuehao Li of Louisiana State University, benefits by incorporating charge relaxation effects for the simulation of conducting dielectrics.

Based on 15 years of experience developing and supporting the electromagnetic modeling capabilities of COMSOL Multiphysics® software, some general misunderstandings of Maxwell's equations that tend to surface regularly are also discussed. Finally, some ideas about the future direction and extension of the COMSOL product line for electromagnetic simulations will be presented.