Nanophotonic Modeling
Lecture 3.22: Unit 3 Summary and Conclusions

Prof. Peter Bermel
Evaluate Maxwell’s PDEs like ODEs using leapfrog method on Yee lattice, in up to 3 dimensions
MEEP

http://jdj.mit.edu/wiki/index.php/Meep
https://nanohub.org/tools/meep

• Finite Difference Time Domain Solver
• Special Features include:
  – Arbitrary dimensionality, boundary conditions
  – Perfectly matched layers
  – Subpixel averaging
  – Symmetry and parallelization
  – Full programmability
MEEP: Subpixel Averaging

Optimizing Ag Nanoparticle Cell Absorption

Max $J_{sc} = 43.8 \text{ mA/cm}^2$

$J_{sc} = 36.6 \text{ mA/cm}^2$

$J_{refl} = 5.0 \text{ mA/cm}^2$

$J_{par} = 3.7 \text{ mA/cm}^2$

Potential light trapping strategy for (MAPbI₃) perovskite/silicon tandem cells

Asymmetric dielectric grating can increase light trapping significantly*.