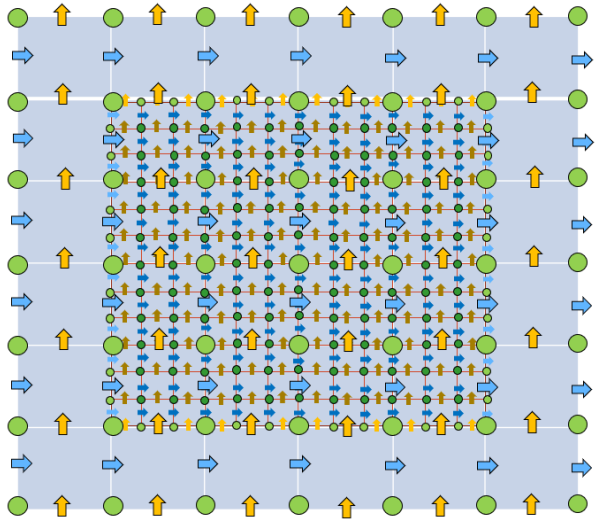
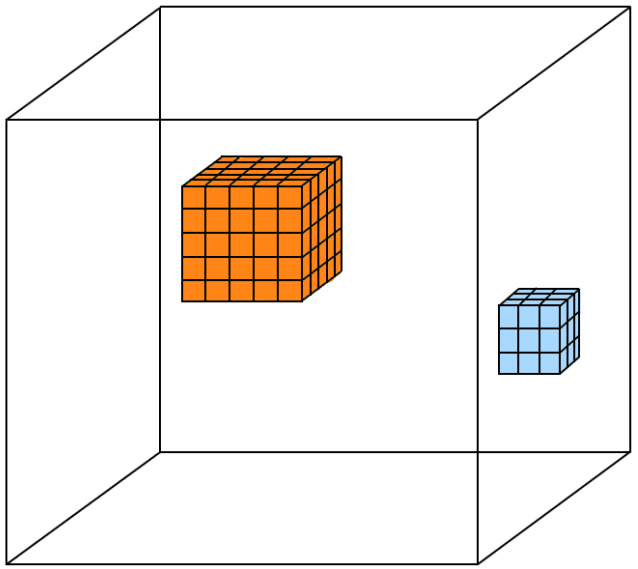
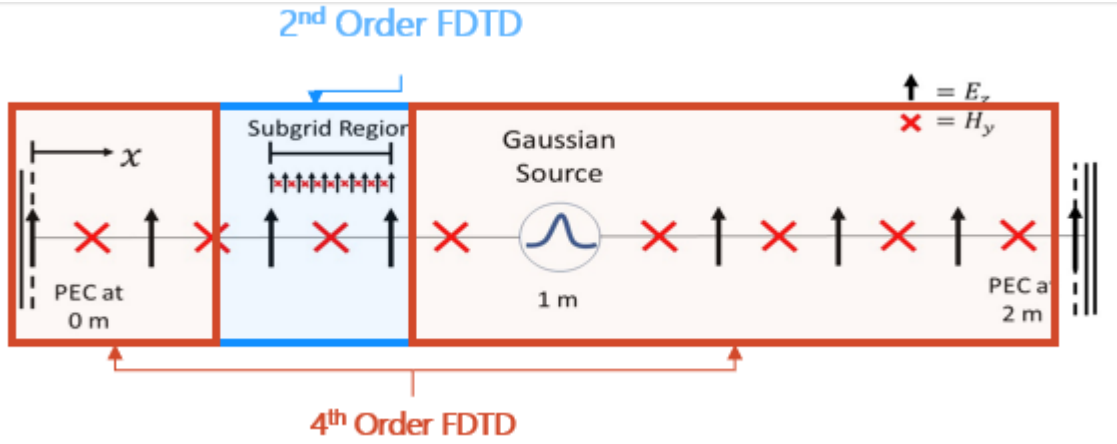
FDTD Subgridding – Madison Le



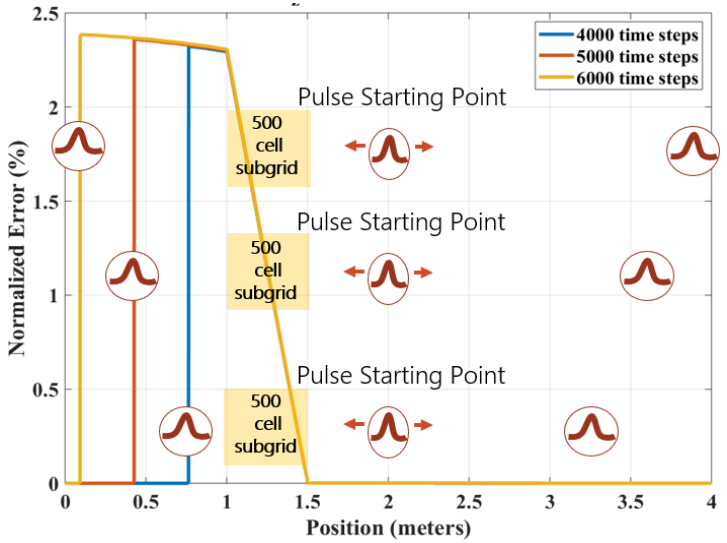


Subgridding could reduce the memory usage to under 30GB, which could be done on a single computer. Subgridding purportedly allows these **electrically large domains** to be **analyzed accurately** without the need for large allocations of **memory and resources**.

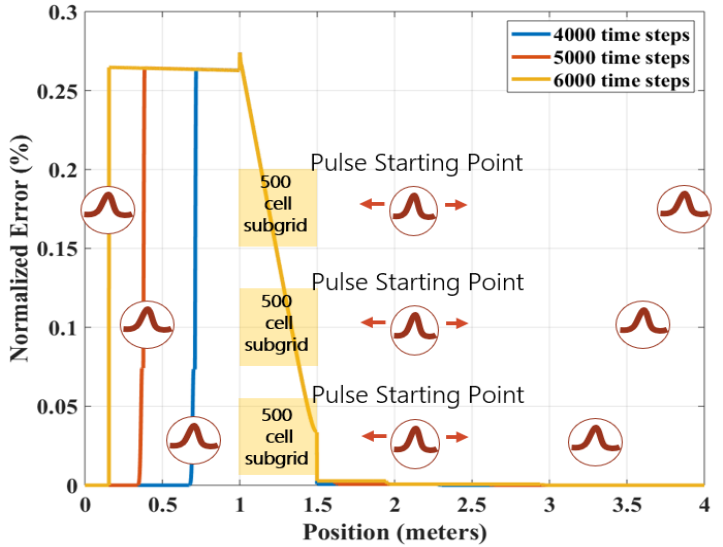


Hybrid domain has shown significant reduction of errors when implementing a subgrid region in 1D domain.

S22 Subgridding Error



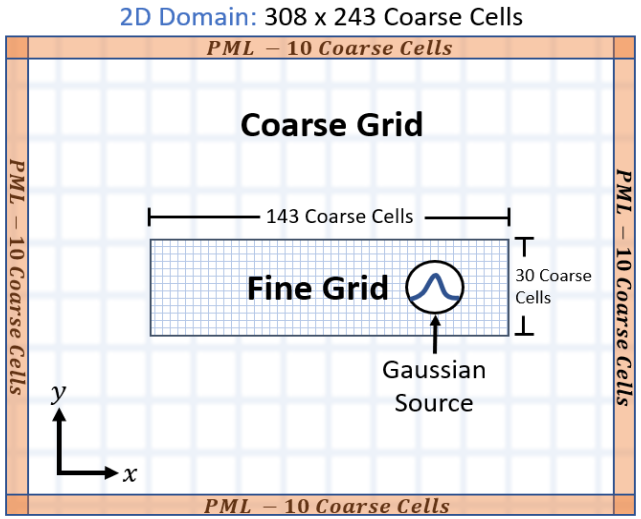
Hybrid (S22, S24) Subgridding Error



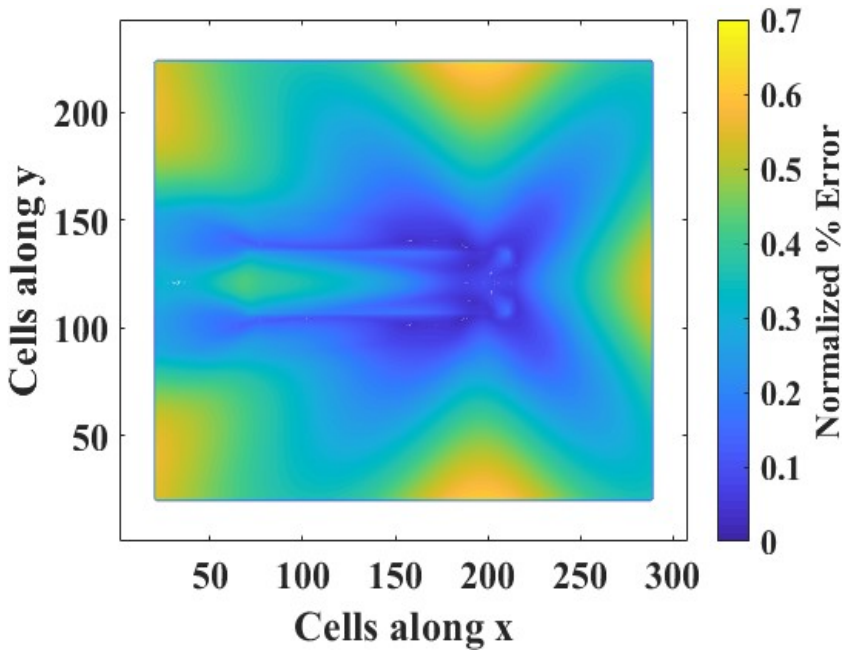
FDTD Subgridding – Madison Le

Hybrid domain has shown significant reduction of errors when implementing a subgrid region in a 2D domain.

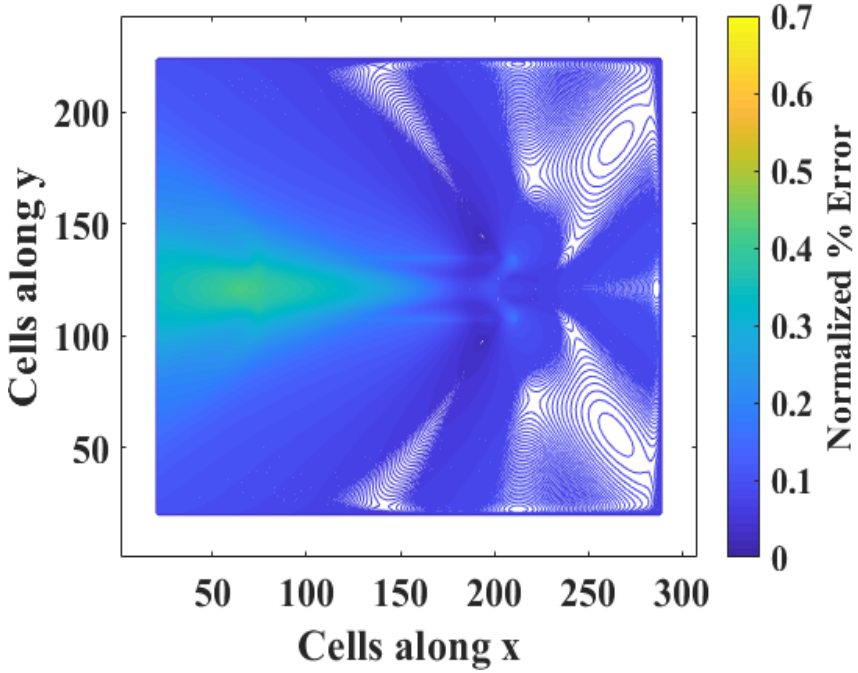
2D Subgrid Domain



S22 Subgridding Error



Hybrid (S22, S24) Subgridding Error



FDTD Subgridding – Madison Le

Future Work:

- Implementation of subgrid regions into 3D domains.
- Multiple subgrid regions of variable contrast ratios in single domain.

Achievements:

- ACES 2019 Student Paper Competition 3rd Place Winner

Publications:

- M. Le, M. Hadi, and A. Elsherbeni, "Quantifying sub-gridding errors when modeling multiscale structures with FDTD," 2019 International Applied Computational Electromagnetics Society (ACES), Miami, FL, USA, pp. 1-2, 2019.
- M. Le, M. Hadi, and A. Elsherbeni, "Quantifying Sub-gridding Errors in Standard and Hybrid Higher Order 2D FDTD Simulations," 2020 International Applied Computational Electromagnetics Society (ACES), Monterey, CA, USA, pp. 1-2, 2020.
- Pre-Submission 2020 Journal Paper: M. Le, M. Hadi, and A. Elsherbeni, "Quantifying Subgridding Errors in FDTD Method with Second and Fourth Order Derivative Approximations"