MEEP: FDTD solver

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BASIC STEPS

- Define Computational Domain
- Define structure
- Define pml
- Set Resolution
- Define Sources
- Define output quantities

Syntax Structure – Scheme interface

- Scheme interface – specifying simulation = setting the values of certain variables.

- General command:

```
(set! VARIABLE_NAME VALUE)
```

Define Computational Grid

Define dimensions (1D, 2D or 3D)-OPTIONAL:

```
(set! Dimensions 2)
```

Define Lattice:

```
(set! geometry-lattice (make lattice
(size 16 16 no-size)))
```

Define Structure

Make Blocks of desired sizes and permittivities at desired postions:

```
(set! geometry (list (make block (center -2
-3.5)(size 12 1 infinity)(material(make
dielectric (epsilon 12))))(make block (center
3.5 2)(size 1 12 infinity)(material dielectric
(epsilon 12))))))
```

Sources

- Equivalent Current sources are defined on basis of desired incident field profile

- Three parts to source:

  - Time dependance / Space Dependance

  - Position

  - Orientation

  - Size

Sources (cont.)

Example 1:

```
(set! sources (list (make source (src (make
continuous-src (frequency 0.15)))(component
Ez)(center -7 0)(size 0 20)(amplitude 2))))
```

Example 2:

```
(set! sources (list (make source (src (make
gaussian-src (frequency 0.15)(width 20)
(start-time 4)(cutoff 5)))(component Ez)
(center -7 0))))
```

PML

- Set PML thickness:

Example 1:

```
(set! pml-layers (list (make pml
(thickness 0.5))))
```

Example 2 (For 1D simulation):

```
(set! pml-layers (list (make pml
(thickness 0.01)(side High))(make pml
(thickness 1.0)(side Low))))
```

Resolution & Output

- Resolution:

  ```
  (set! Resolution 50)
  ```

- Output:

  ```
  (run-until 1000 (at-beginngin output-
  epsilon)(at-end output-efield-z))
  ```