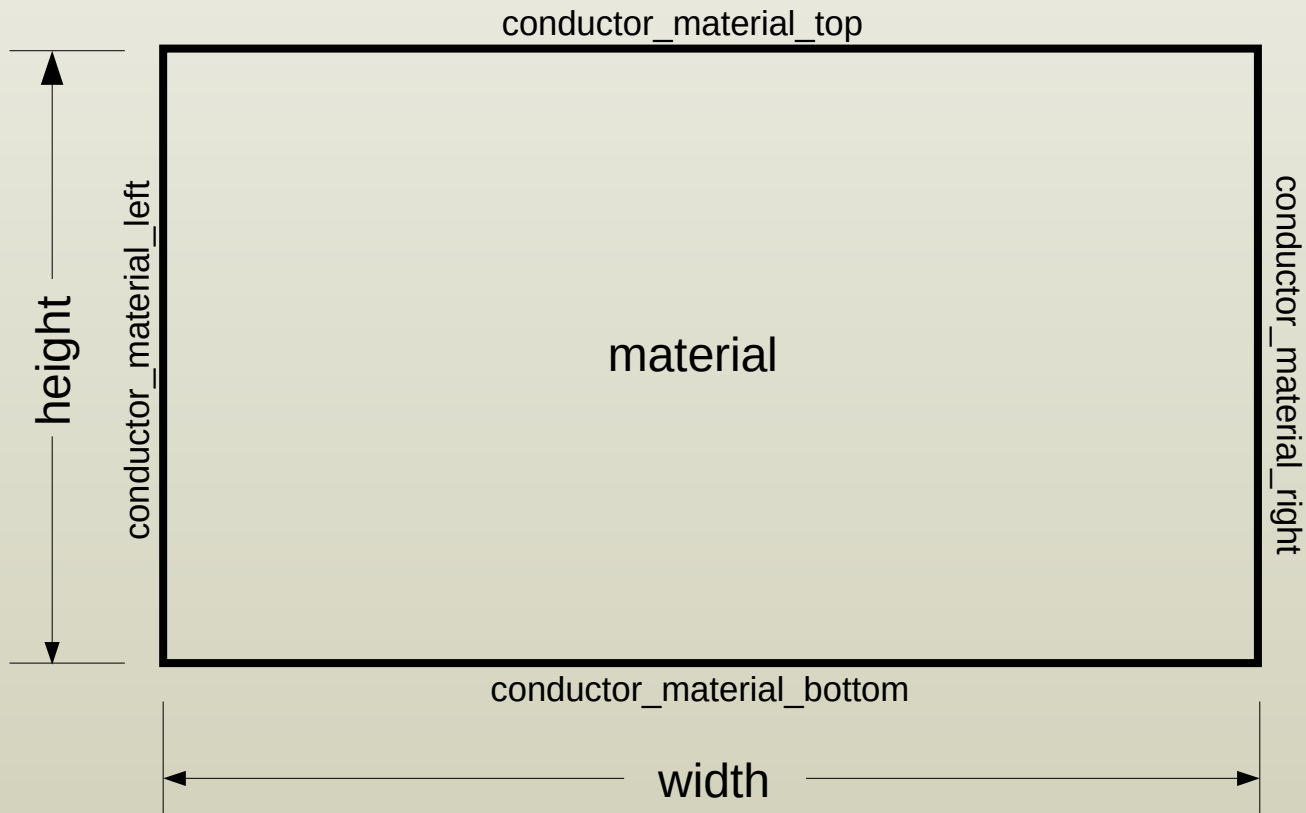


builder Specifications

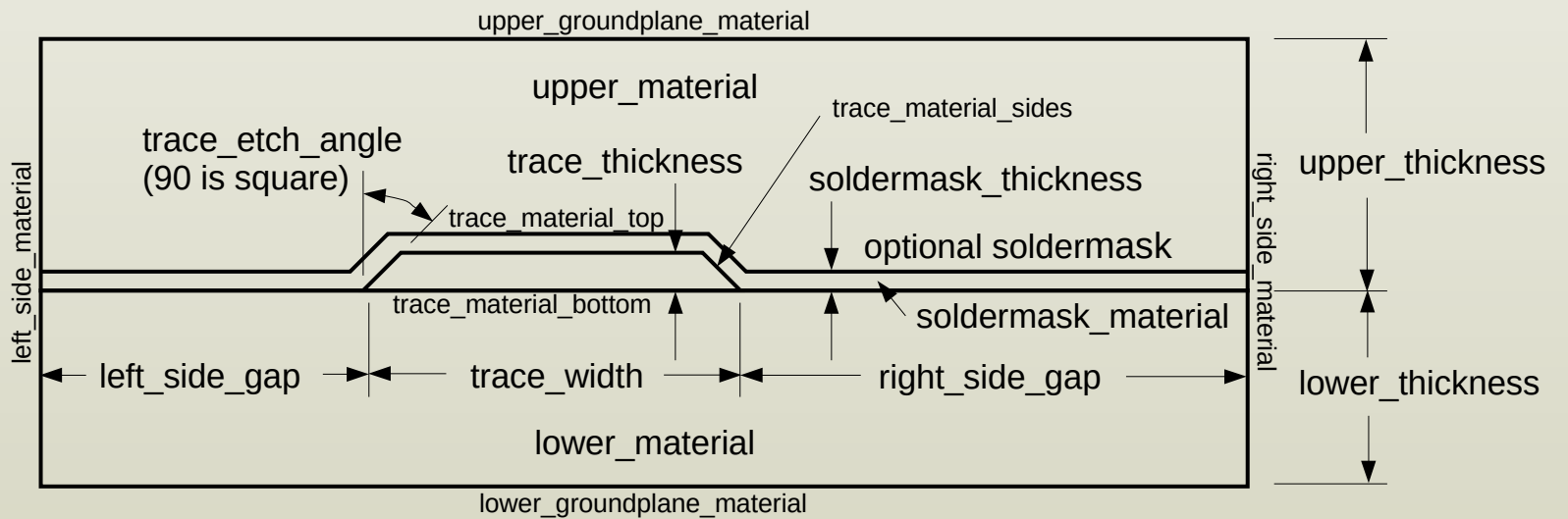
builder

- builder is a command line tool that uses a single text file for all inputs.
- It produces three output text files for use in quickly building projects for solution with OpenParEM2D
 - *.geo - geometrical input file for gmsh
 - *_modes.txt - boundary/modes file for OpenParEM2D
 - *.proj - Control project file for OpenParEM2D
- Supported transmission lines and waveguides
 - rectangular waveguide
 - microstrip
 - symmetric coupled microstrip
 - asymmetric coupled microstrip
 - stripline
 - symmetric coupled stripline
 - asymmetric coupled stripline

Rectangular Waveguide

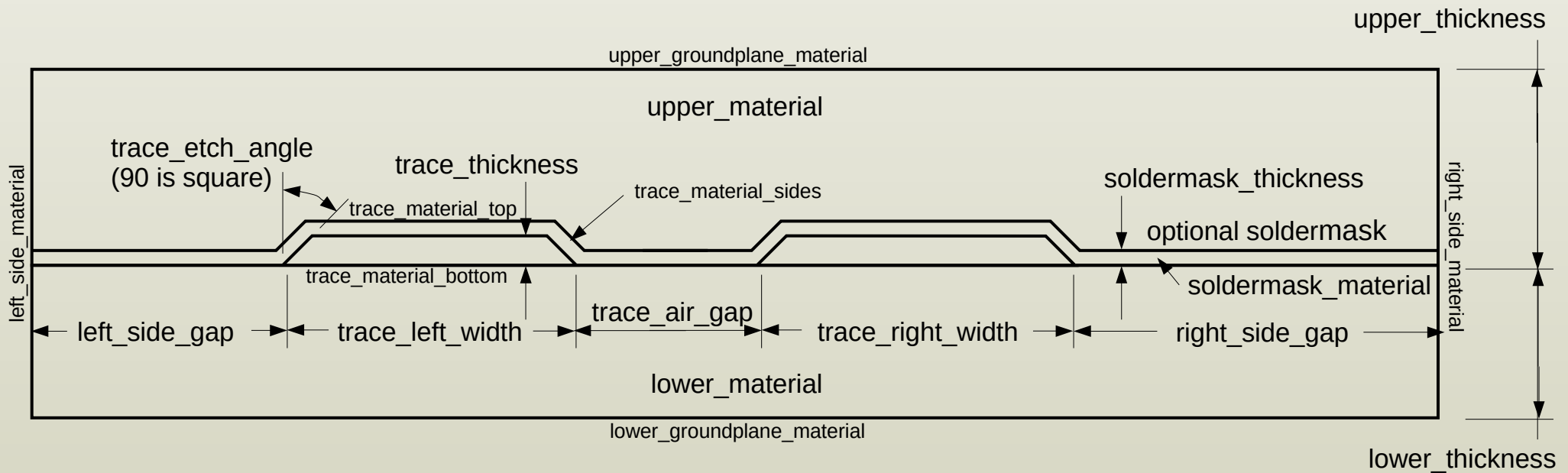


Strip



Use for microstrip and stripline.

CoupledStrip



Use for symmetric and asymmetric coupled microstrip and stripline.

builder File Specification

- The builder input file is a text file that uses keyword/value pairs to control the build.
- Use one keyword/value pair per line.
- Keywords can appear in the file more than once, and the last entry is the one that is used.
 - Note: No error message or warning is issued when keyword values are overwritten.
- The first line of the file must be
`#builder 1.0`

builder File Keyword/Value Pairs

```
#builder 1.0
```

```
// enable multiple definitions in one file
```

```
// call out the one to build here
```

```
Control
```

```
    build=name
```

```
    check_limits={true|false}
```

```
EndControl
```

```
// The "include=name" option pulls in data from the named case to enable a change from one case to propagate to others.
```

```
// When used, any further data included in the block supersedes the included data.
```

```
// The included data must be in the same file.
```

```
RectangularWaveguide
```

```
    name=string
```

```
    [include=name]
```

```
    width=double
```

```
    height=double
```

```
    material=string
```

```
// set conductor material to "PEC" (without the quotes) for no conductor losses
```

```
default_conductor_material=string // this is optional if all 4 of the materials below are specified
```

```
// material overrides useful for varying surface roughness; can also specify PEC or PMC
```

```
[conductor_material_top=string]
```

```
[conductor_material_bottom=string]
```

```
[conductor_material_left=string]
```

```
[conductor_material_right=string]
```

```
EndRectangularWaveguide
```

```

// Use Strip to define microstrip and stripline.
Strip
    name=string
    [include=name]
    use_symmetry={true|false}           // faster solve time when true
                                         // user must divide the impedance result by 2

    default_conductor_material=string    // optional if all other materials are specified
    left_side_gap=double                 // measured from the farthest leftward extension of the trace
    [left_side_material=string]          // a material, PEC, or PMC
    right_side_gap=double                 // measured from the farthest rightward extension of the trace
    [right_side_material=string]         // a material, PEC, or PMC
    upper_thickness=double                // measured from the top of the lower thickness
    upper_material=string

    [soldermask_thickness=double]        // thin soldermasks can cause numerical problems in the solution
    [soldermask_material=string]         // required for a non-zero soldermask thickness

    lower_thickness=double
    lower_material=string

    trace_thickness=double
    trace_width=double                   // width applies at the bottem next to the substrate
    trace_etch_angle=double              // degrees; 90 for vertical

    // material overrides useful for varying surface roughness or applying symmetry
    [trace_material_bottom=string]
    [trace_material_top=string]
    [trace_material_sides=string]
    [upper_groundplane_material=string]  // planes and sides can also specify PEC or PMC to create
                                         // symmetric coupled lines

    [lower_groundplane_material=string]
EndStrip

```



```

// Use CoupledStrip to define symmetric and asymmetric microstrip and stripline pairs.
CoupledStrip
    name=string
    [include=name]
    default_conductor_material=string    // optional if all other materials are specified
    left_side_gap=double                 // measured from the farthest leftward extension of the trace
    [left_side_material=string]          // a material, PEC, or PMC
    right_side_gap=double                // measured from the farthest rightward extension of the trace
    [right_side_material=string]         // a material, PEC, or PMC
    upper_thickness=double                // measured from the top of the lower thickness
    upper_material=string
    [soldermask_thickness=double]        // thin soldermasks can cause numerical problems in the solution
    [soldermask_material=string]         // required for a non-zero soldermask thickness
    lower_thickness=double
    lower_material=string
    trace_left_width=double              // width applies at the bottem next to the substrate
    trace_right_width=double             // width applies at the bottem next to the substrate
                                          // set to 0 to force trace_right_width=trace_left_width for symmetric pair
    trace_thickness=double
    trace_air_gap=double                 // measured from from edge-to-edge at the bottom next to the substrate
    trace_etch_angle=double              // degrees; 90 for vertical
    // material overrides useful for varying surface roughness or applying symmetry
    [trace_material_bottom=string]
    [trace_material_top=string]
    [trace_material_sides=string]
    [upper_groundplane_material=string]  // planes and sides can also specify PEC or PMC to create
                                          // symmetric coupled lines
    [lower_groundplane_material=string]
EndCoupledStrip

```