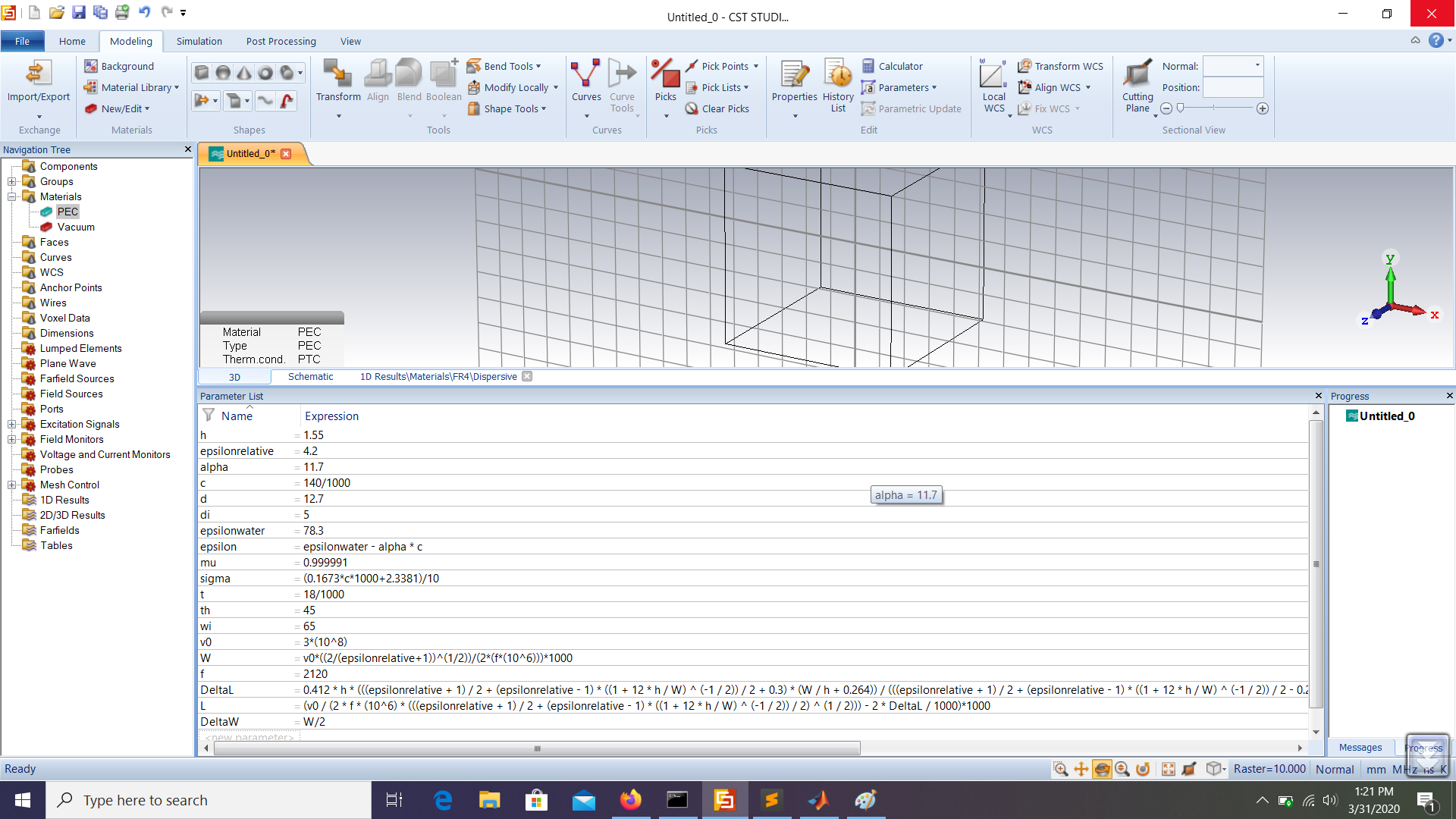
**2D CAD Guide**

**Step 0: Set up the CST file.**

Remember to set length to units of ‘mm’ and frequency to units of ‘MHz’.

**Step 1: Enter parameters as shown below.**



**For your experiment, the value for f is different, please take note!**

The very long expression for DeltaL is

|  |
| --- |
| 0.412 \* h \* (((epsilonrelative + 1) / 2 + (epsilonrelative - 1) \* ((1 + 12 \* h / W) ^ (-1 / 2)) / 2 + 0.3) \* (W / h + 0.264)) / (((epsilonrelative + 1) / 2 + (epsilonrelative - 1) \* ((1 + 12 \* h / W) ^ (-1 / 2)) / 2 - 0.258) \* (W / h + 0.8)) |

Do add these two parameters as well:

|  |  |
| --- | --- |
| Name | Expression |
| factorWf | 14 |
| Wf | W/factorWf |

**Step 2: Create the substrate**

Create a brick called ‘SUBSTRATE’ with the following parameters:

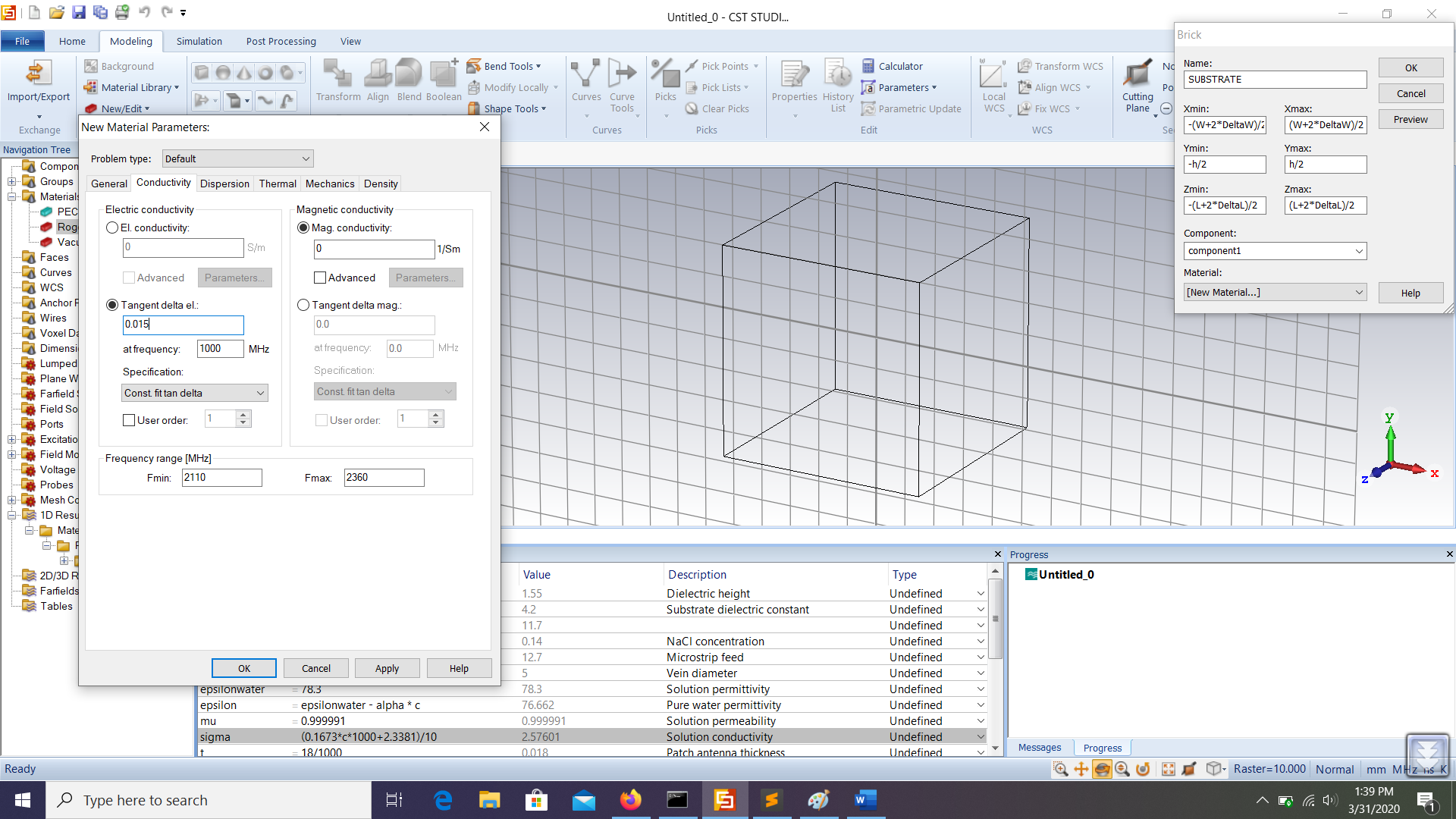
|  |  |  |  |
| --- | --- | --- | --- |
| Xmin: | -(W+2\*DeltaW)/2 | Xmax: | (W+2\*DeltaW)/2 |
| Ymin: | -h/2 | Ymax: | h/2 |
| Zmin: | -(L+2\*DeltaL)/2 | Zmax: | (L+2\*DeltaL)/2 |

Use a new material (created by you), called ‘FR4’ with the following properties:

*General*

|  |  |
| --- | --- |
| Epsilon | epsilonrelative |
| RGB | 240, 209, 194 |

*Conductivity: Only change tangent delta el. and at frequency as shown below. Do not change the rest.*



**Step 3: Create the ground plane**

Click on either side of the substrate and extrude annealed copper at a height of t.

**Step 4: Create the antenna**

Pick the face of the other side (the side that was not involved in Step 3).

Align the WCS plane on the face picked.

Create the patch antenna made of annealed copper with the following parameters:

|  |  |  |  |
| --- | --- | --- | --- |
| Umin: | -W/2 | Umax: | W/2 |
| Vmin | -L/2 | Vmax: | L/2 |
| Wmin: | 0 | Wmax: | h |

**Step 5: Create the microstrip feed**

Do not realign the WCS plane from the previous step.

Using the previous WCS plane, make the microstrip feed using annealed copper with the following parameters:

|  |  |  |  |
| --- | --- | --- | --- |
| Umin: | -Wf/2 | Umax: | Wf/2 |
| Vmin | -L/2-DeltaL/2 | Vmax: | -L/2 |
| Wmin: | 0 | Wmax: | h |

**Step 6: Add the microstrip feed and the patch antenna.**

**Step 7: Create a waveguide port**

Pick the cross section of the microstrip feed.

Create a waveguide port, with the change the entry on Ymin from 0 to t + h.