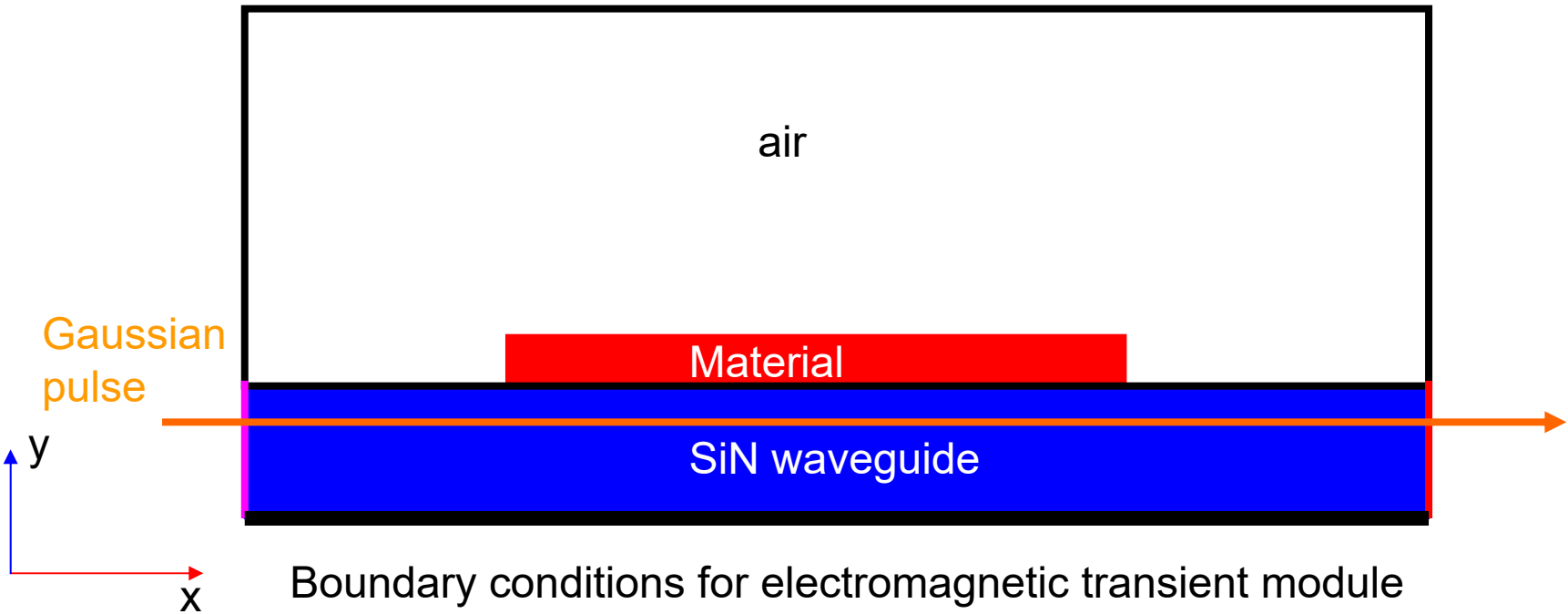


Comsol module:

- Global Definitions
- P_i Parameters
- Analytic 1 (*w*)
- Analytic 2 (*eta*)
- Analytic 3 (*R*)
- Materials
- Component 1 (*comp1*)
- Definitions
- Geometry 1
- Materials
- Electromagnetic Waves, Transient (*ewt*)
- Heat Transfer in Solids (*ht*)
- Multiphysics
 - Electromagnetic Heat Source 1 (*emh1*,
- Mesh 1
- Study 1
- Results



— Perfect electric conductor

— Scattering boundary condition

Incident electric field

$$E_x = 0$$

$$E_y = 0$$

$$E_z = E_0 \sqrt{\frac{w_0}{w(x)}} e^{-(y/w(x))^2} \cos\left(\omega t - kx + \eta(x) - \frac{ky^2}{2R(x)}\right) \exp(-(t-t_0)^2/dt^2)$$

where

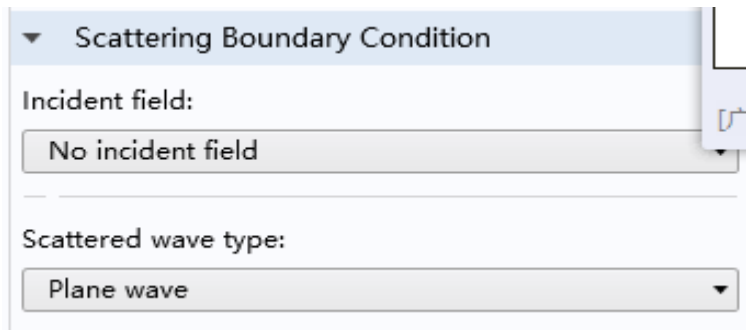
$$w(x) = w_0 \sqrt{1 + \left(\frac{x}{x_0}\right)^2}$$

$$\eta(x) = \frac{1}{2} \text{atan}\left(\frac{x}{x_0}\right)$$

$$R(x) = x \left(1 + \left(\frac{x_0}{x}\right)^2\right)$$

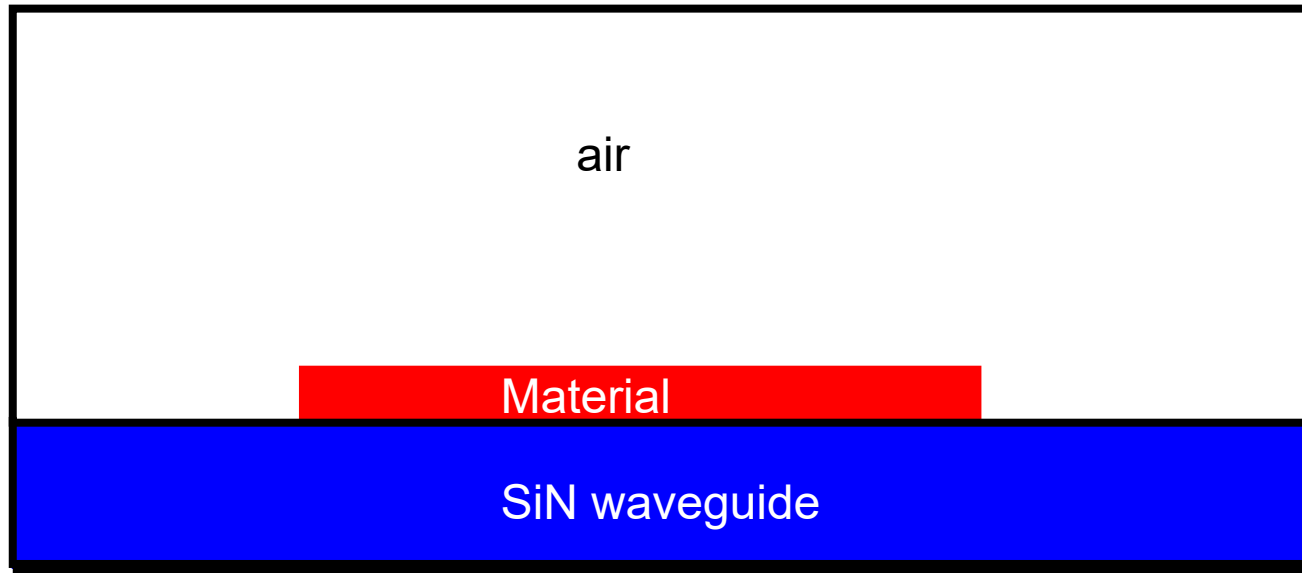
w_0 is the minimum waist, w is the angular frequency, y is the in-plane transverse coordinate, k is the wave number, x_0 is the Rayleigh range, $R(x)$ is the radius of curvature of the wavefront, $\eta(x)$ is the Gouy phase. t_0 is the time delay and dt is the pulse width.

Scattering boundary condition

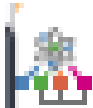


The image shows a software interface for setting scattering boundary conditions. It features a dropdown menu titled "Scattering Boundary Condition" with a downward arrow. Below this, there are two sections: "Incident field:" with a dropdown menu set to "No incident field", and "Scattered wave type:" with a dropdown menu set to "Plane wave".

Boundary conditions for heat transfer transient module



All the boundaries are maintained at room temperature



Multiphysics



Electromagnetic Heat Source 1 (*emh1*)

Show equation assuming:

Study 1, Frequency-Transient

$$\rho C_p \frac{\partial T}{\partial t} + \rho C_p \mathbf{u} \cdot \nabla T = \nabla \cdot (k \nabla T) + Q_e$$

$$Q_e = Q_{rh} + Q_{ml}$$

$$Q_{rh} = \frac{1}{2} \text{Re}(\mathbf{J} \cdot \mathbf{E}^*)$$

$$Q_{ml} = \frac{1}{2} \text{Re}(i\omega \mathbf{B} \cdot \mathbf{H}^*)$$

▼ Coupled Interfaces

Electromagnetic:

Electromagnetic Waves, Transient (ewt)

Heat transfer:

Heat Transfer in Solids (ht)

Solve setting

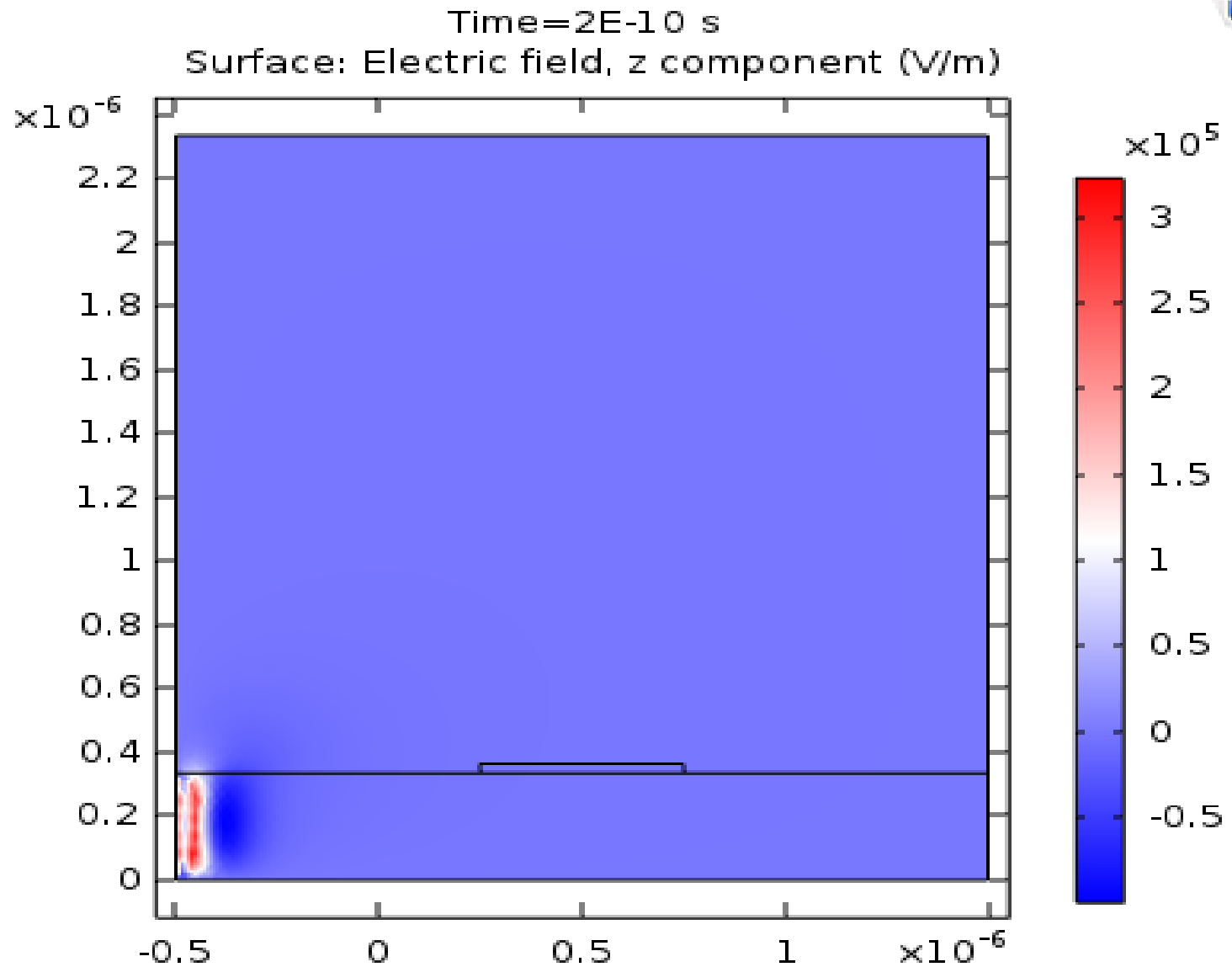
Study 1

 Step 1: Time Dependent

 Step 2: Frequency-Transient

 Solver Configurations

Electric field distribution



temperature distribution

