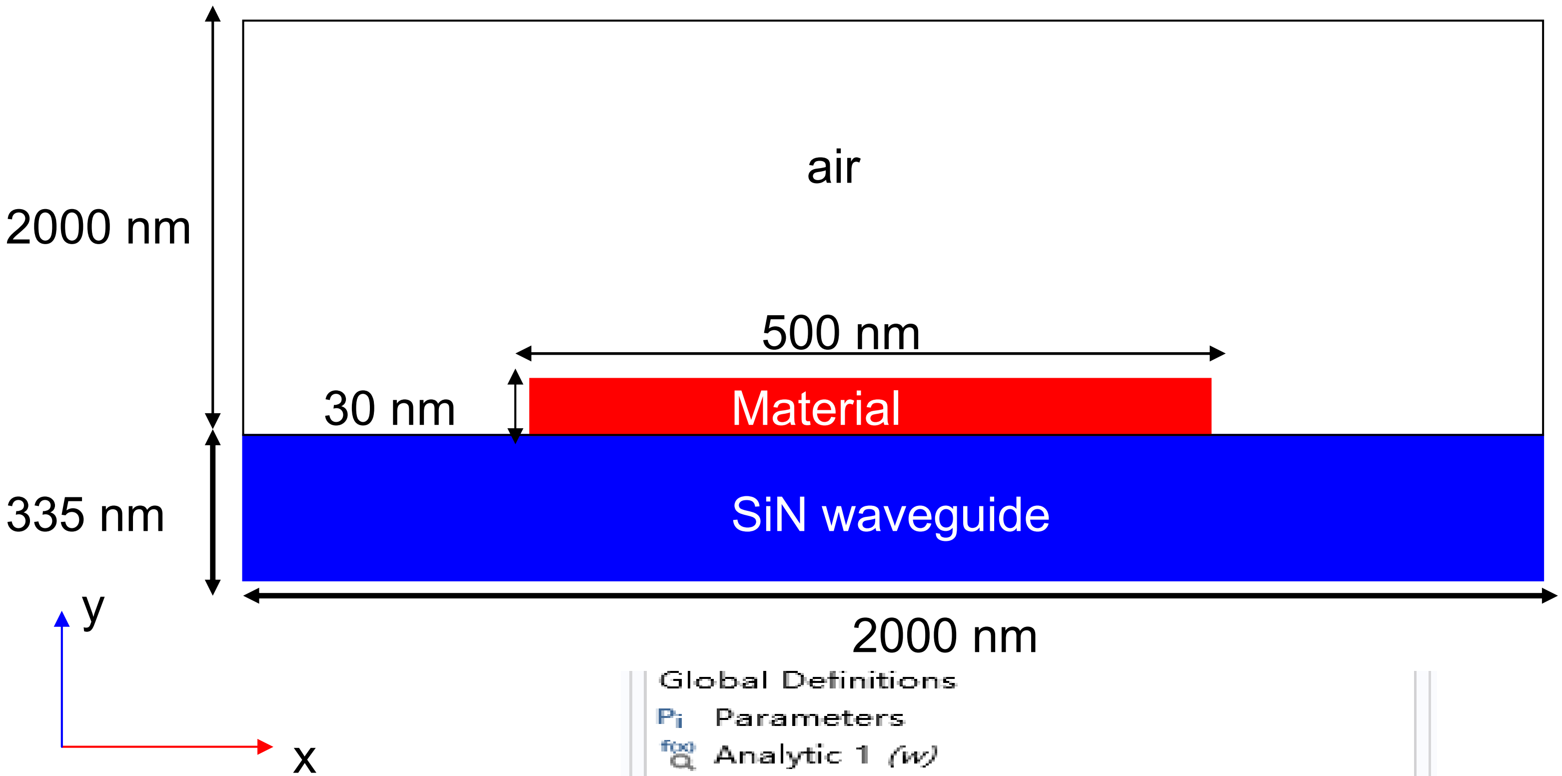
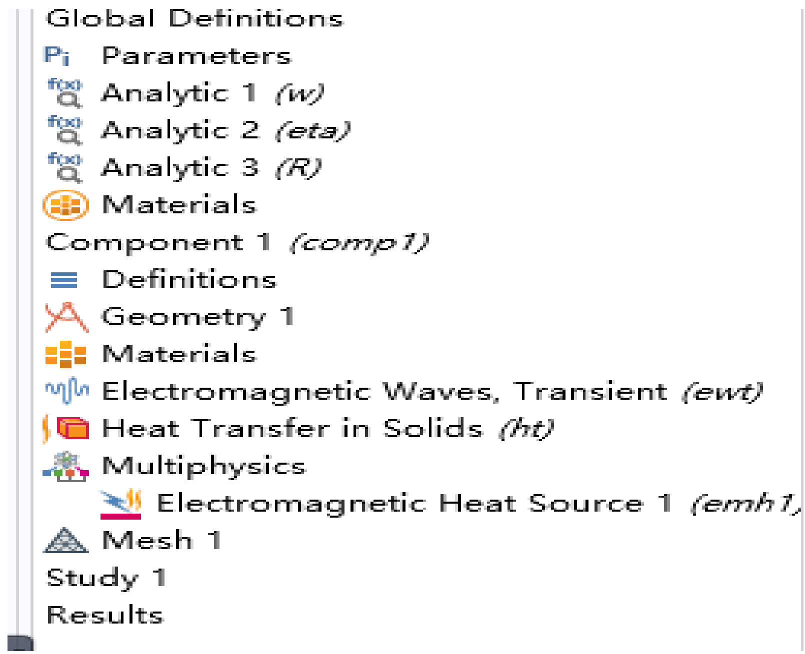
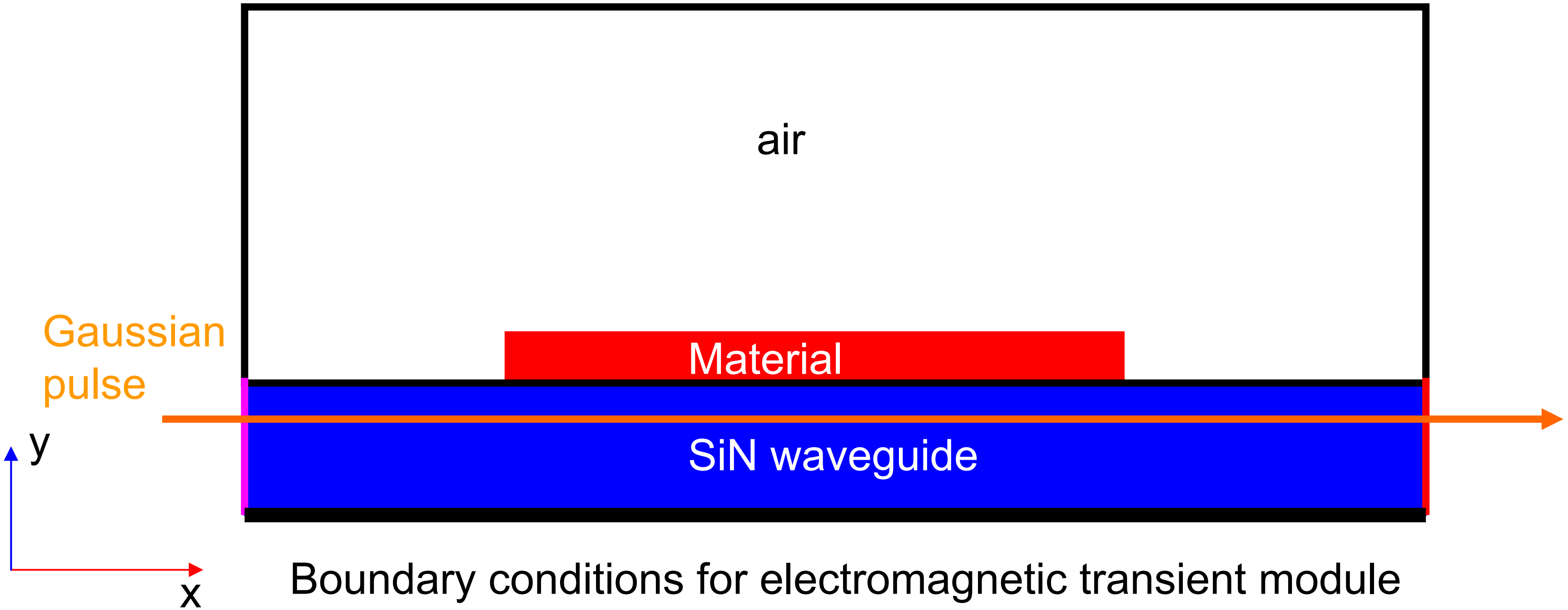


Comsol module:





Boundary conditions for electromagnetic transient module

Perfect electric conductor

Scattering boundary condition

Incident electric field

$E_x=0$

$E_y=0$

$$E_z = E_0\sqrt{\frac{w_0}{w(x)}}e^{-(y/w(x))^2}\cos\left(\omega t - kx + \eta(x) - \frac{ky^2}{2R(x)}\right)\exp(-(t-t0)^2/dt^2)$$

where

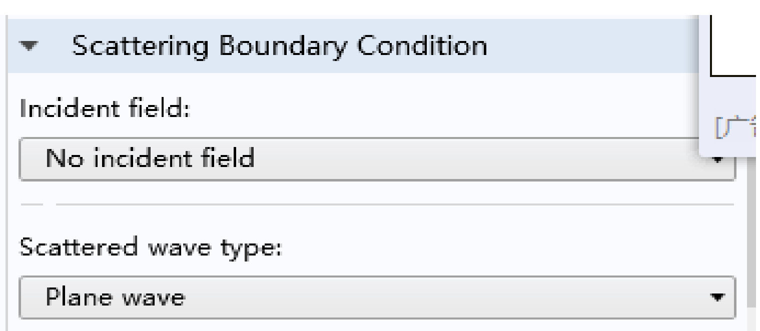
$$w(x) = w_0\sqrt{1+\left(\frac{x}{x_0}\right)^2}$$

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

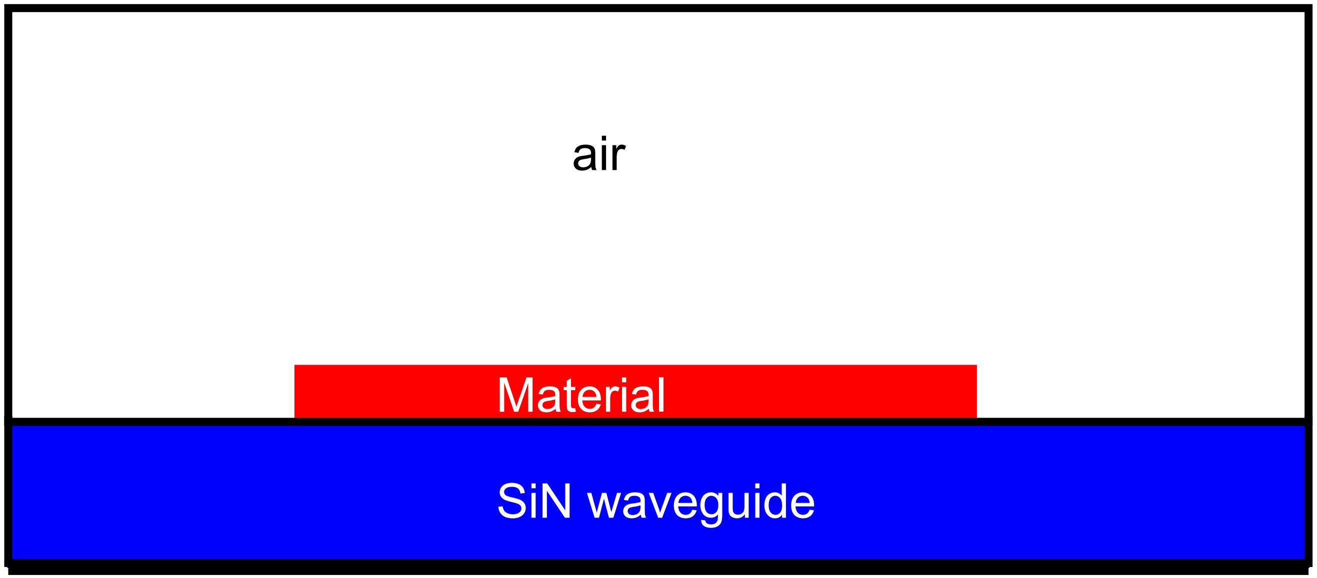
$$R(x) = x\left(1+\left(\frac{x_0}{x}\right)^2\right)$$

w0 is the minimum waist, w is the angular frequency, y is the in-plane transverse coordinate, k is the wave number, x0 is the Rayleigh range, R(x) is the radius of curvature of the wavefront, η(x) is the Gouy phase. t0 is the time delay and dt is the pulse width.

Scattering boundary condition



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

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

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

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

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

Coupled Interfaces

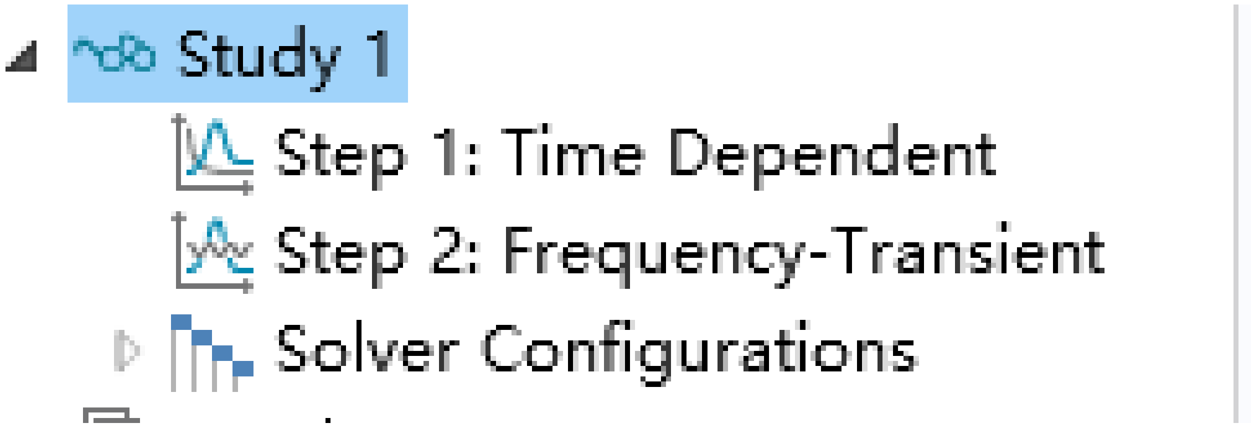
Electromagnetic:

Electromagnetic Waves, Transient (ewt)

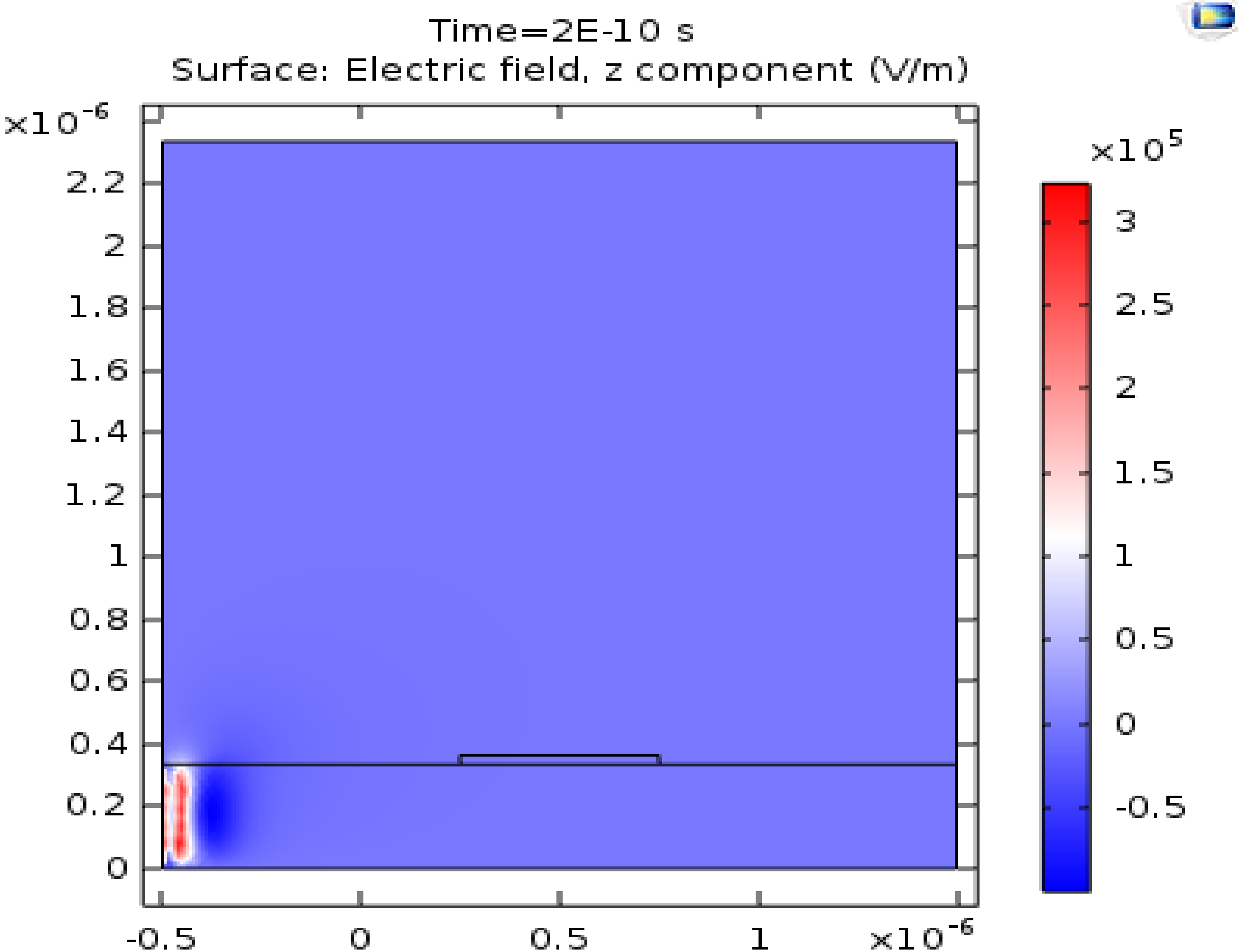
Heat transfer:

Heat Transfer in Solids (ht)

Solve setting



Electric field distribution



temperature distribution