Simulation geometry for OIDT
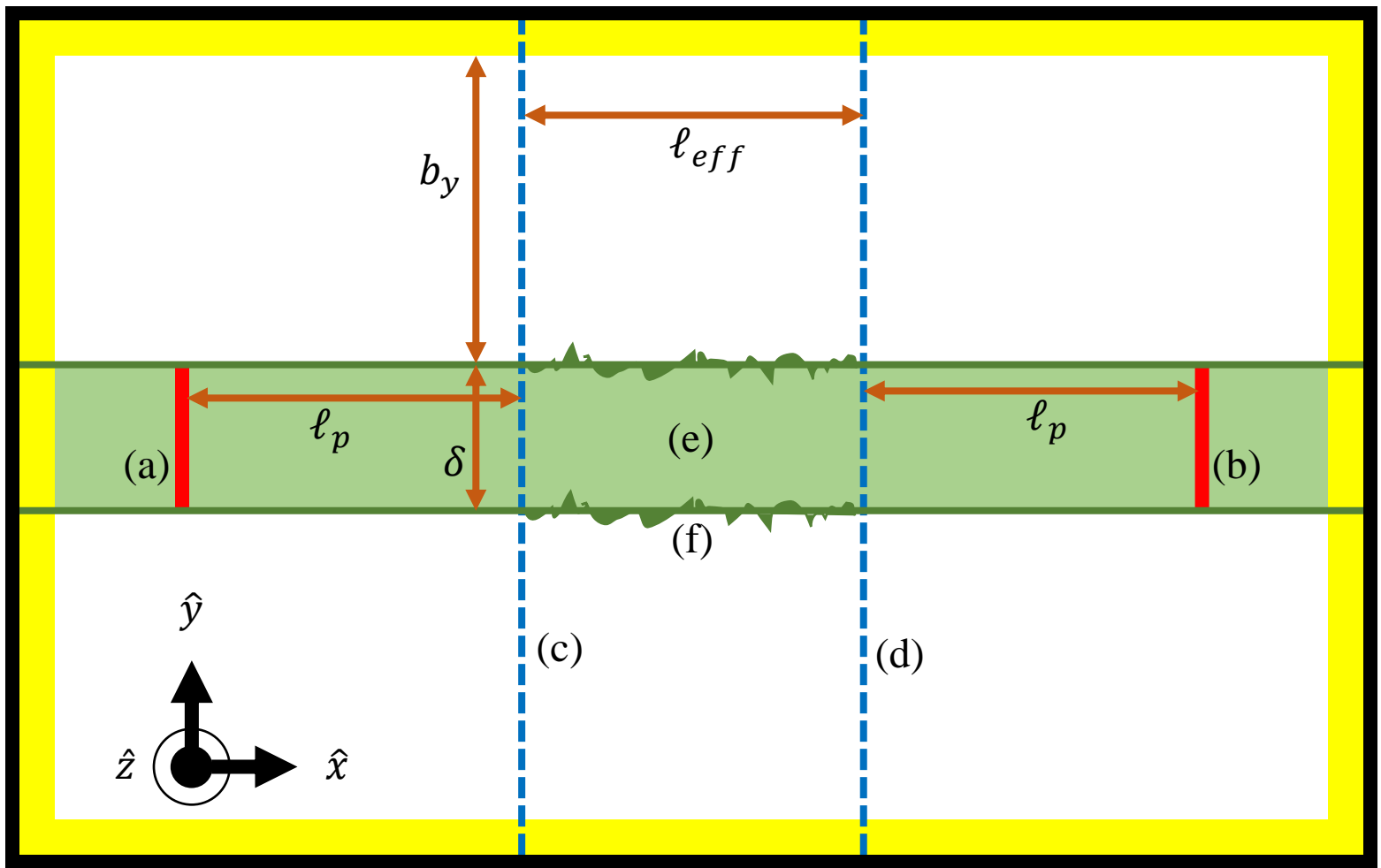
This document contains the structural geometry for 2D and 3D simulations for the OIDT.

Perfect Electric Conductor (PEC) Bounding Box
Convolution Perfectly Matched Layer (CPML) Region [3]
Waveguide Core Region
Waveguide Cladding Region
Core/Cladding Region Boundary
Source Condition
Port Location

ℓ_{eff}: Effective length
ℓ_p: Port length
δ: Waveguide width
b_y: Cladding size. This parameter is automated in the FDTD setup. It is set as $5/\gamma$ by default [6].

a) Source location for sim=1 and sim=2. Used for most simulations.
b) Source location for sim=3 and sim=4. Used only for S-parameter Extraction.
c) Port 1 location (S-parameters)
d) Port 2 location (S-parameters)
e) Test region. This is the only region in which nonideal simulation parameters exist, e.g., surface roughness.
f) Surface Roughness Profile.
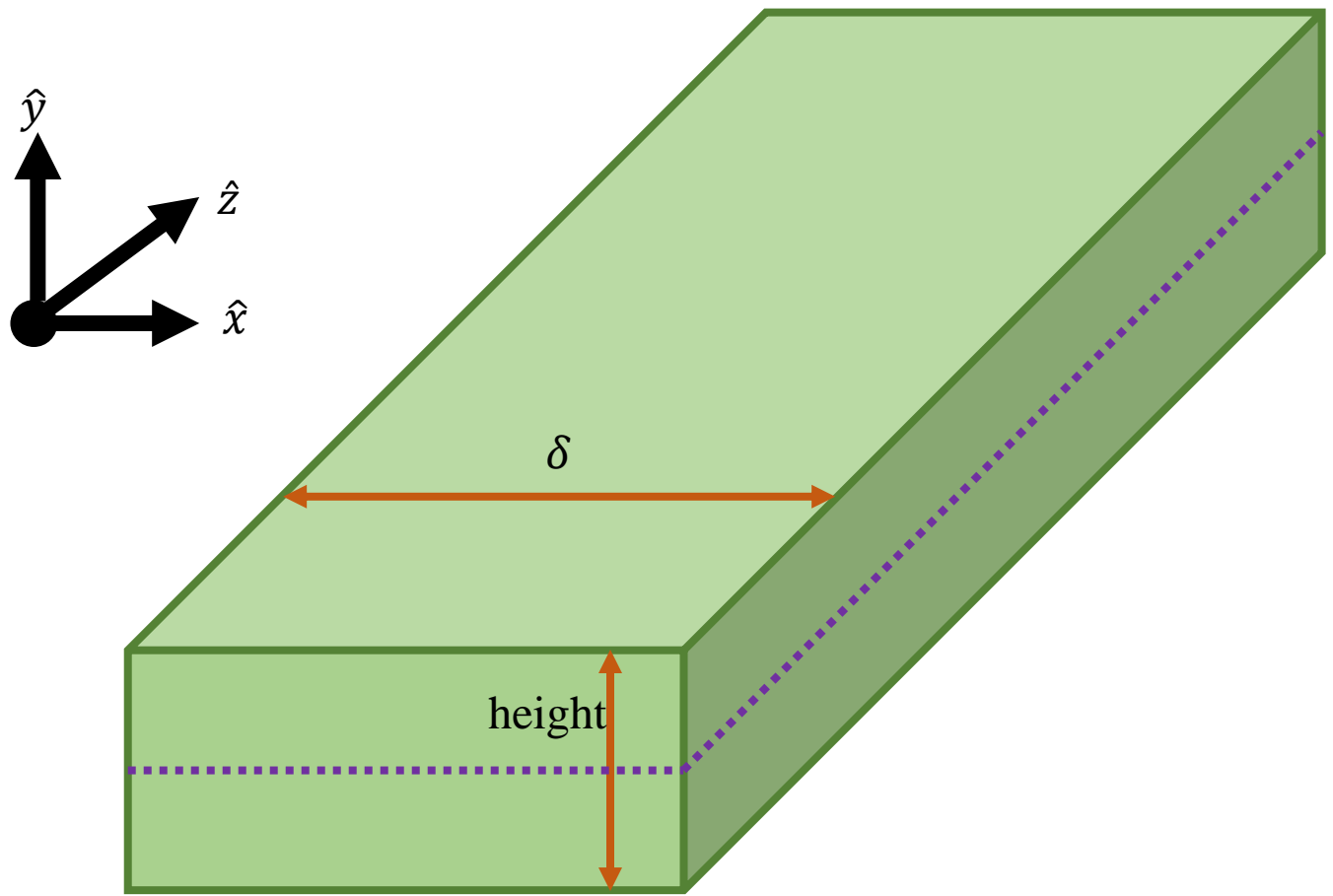
■ 2D cross-section location
□ Waveguide Core Region
■ Core/Cladding Region Boundary

Much like the 2D setup, there exists b_x and b_y along their respective directions in this setup. These are set as $4/\gamma_x$ and $4/\gamma_y$ by default. 4 is used instead of 5 to conserve memory and decrease computation time. All the finer details in the 2D setup are present in this 3D setup, including source locations, port locations, effective lengths, CPML boundary, and PEC bounding box, but those details would obscure the core structure and major components of shape and dimension. The 2D cross-section shows where the 2D model can be used as a reference for the omitted details.