

Electric and magnetic fields along the beam axis of NSLS-II kicker

Medani P. Sangroula

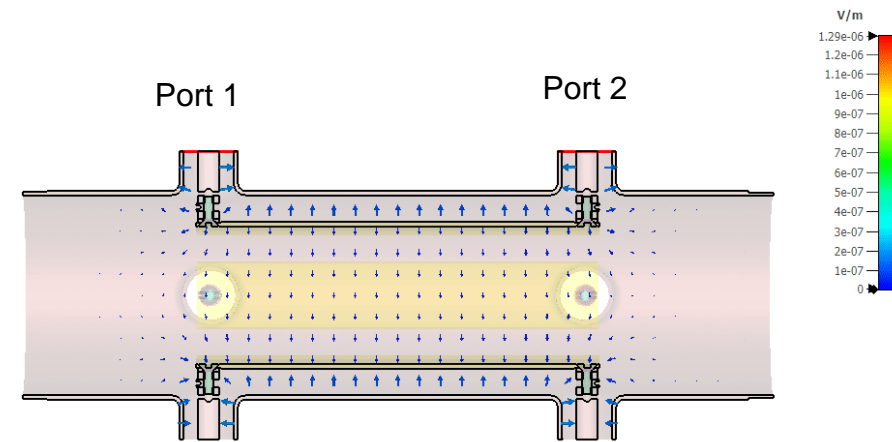
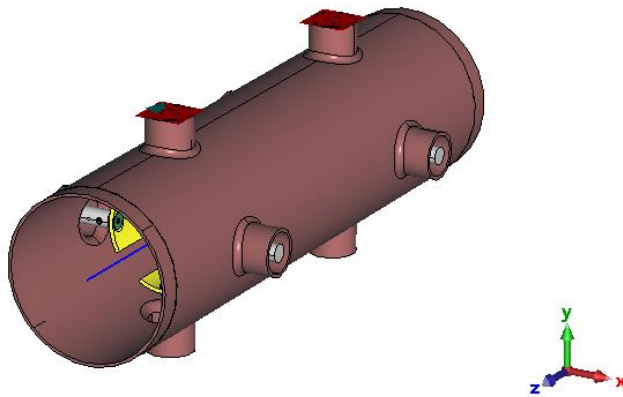
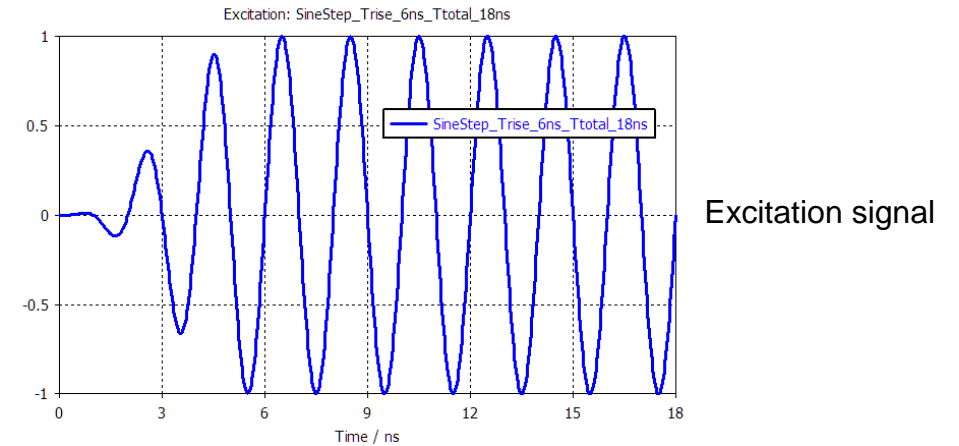
07/22/2022



@BrookhavenLab

Wave ports with sine step signal of 500 MHz

- We excited different types of signals and studied the E and H-fields along the beam axis.
- Signal is excited from the port 1.
- Also, voltage monitors are placed at the both ports to record the voltage amplitude.

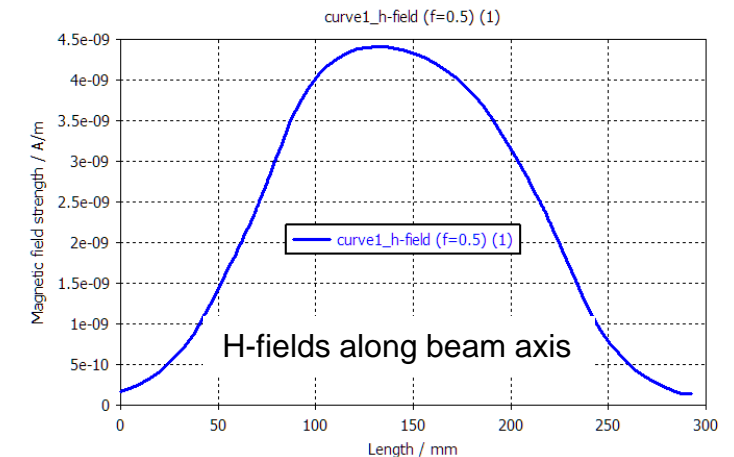
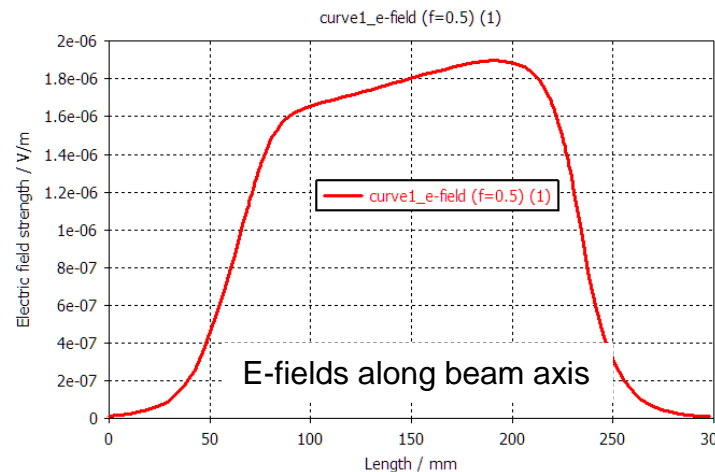
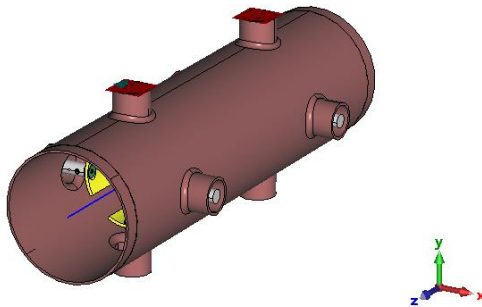
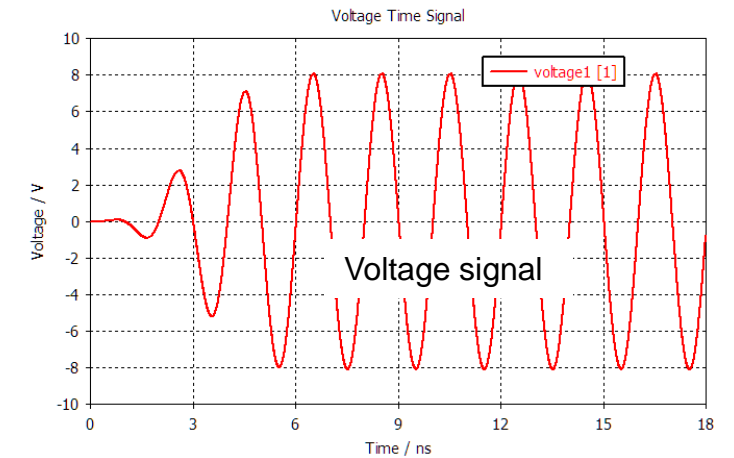
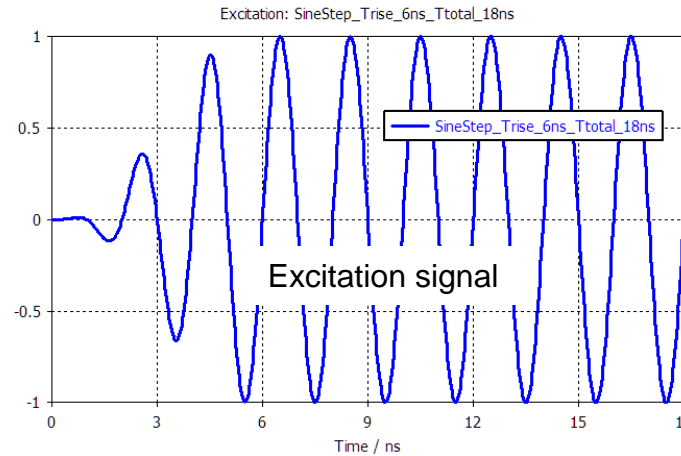


e-field (f=0.5) [1]

Frequency	0.5 GHz
Phase	0 °
Cross section	A
Cutplane at X	-0.000 mm
Maximum on Plane (Plot)	8.82185e-07 V/m
Maximum (Solver)	1.4474e-06 V/m

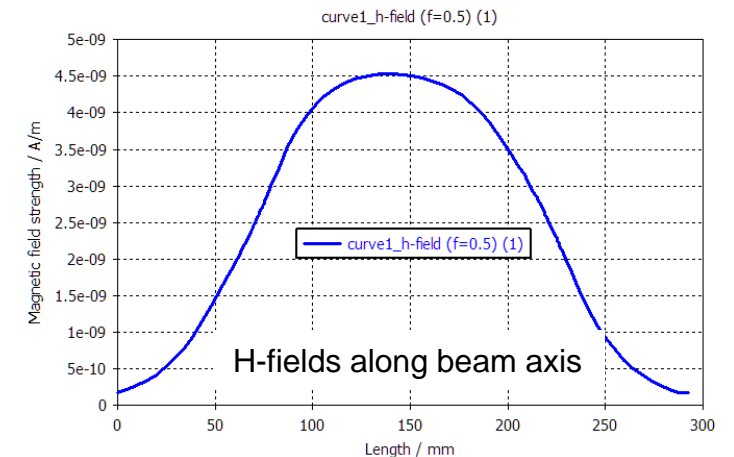
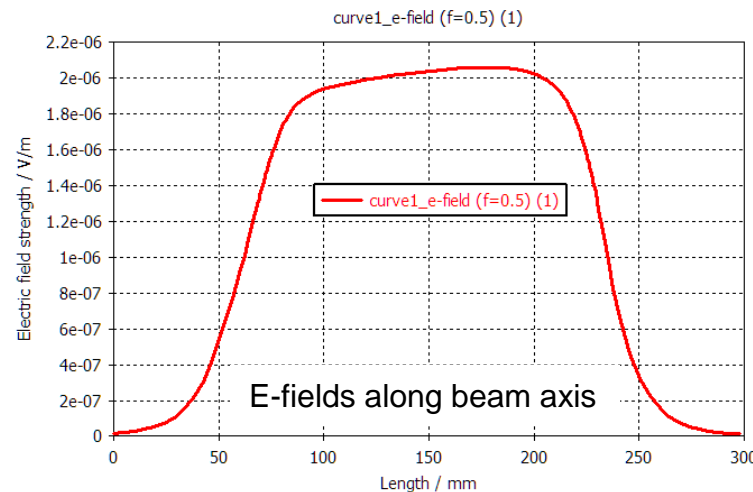
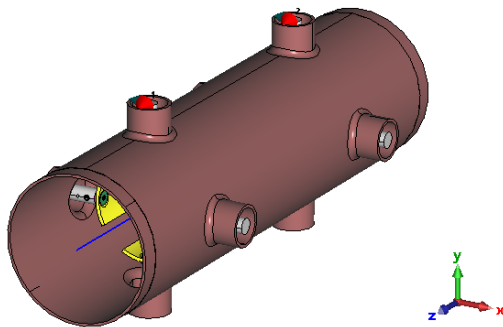
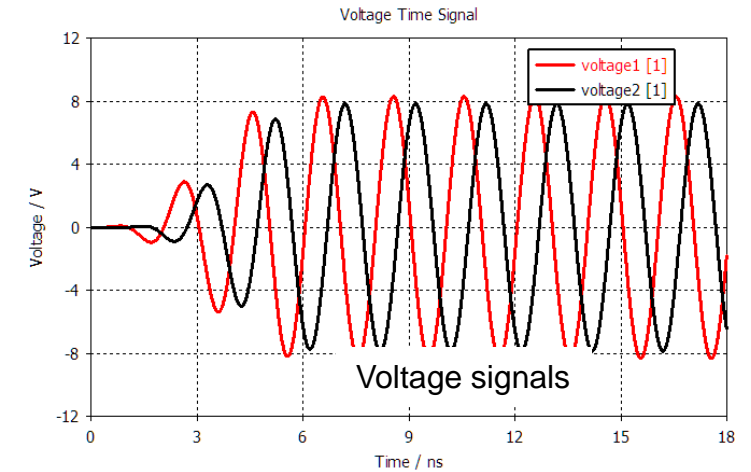
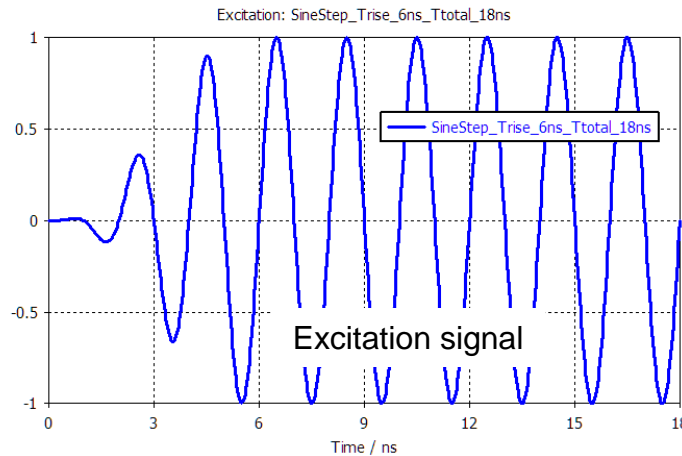
Wave ports with sine step signal of 500 MHz

- First, we excited the sine step signal with the rise time of 6ns and 500 MHz is excited via a waveguide port.
- Only $\frac{1}{4}$ of the structure is simulated



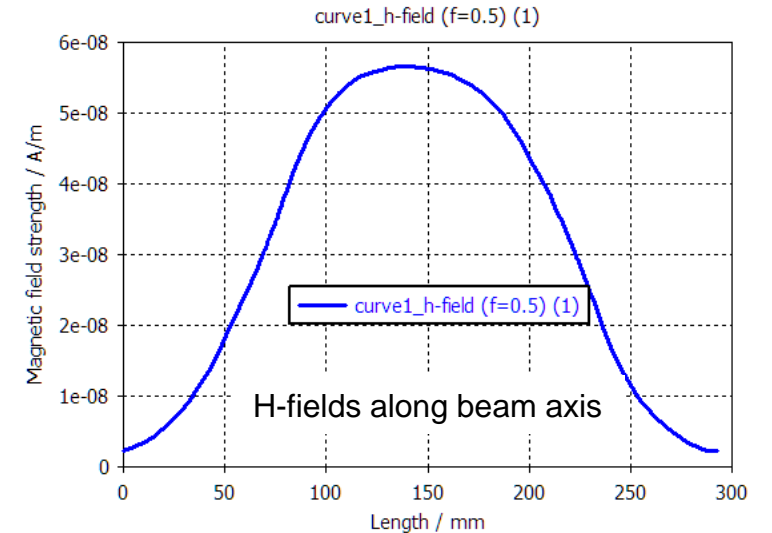
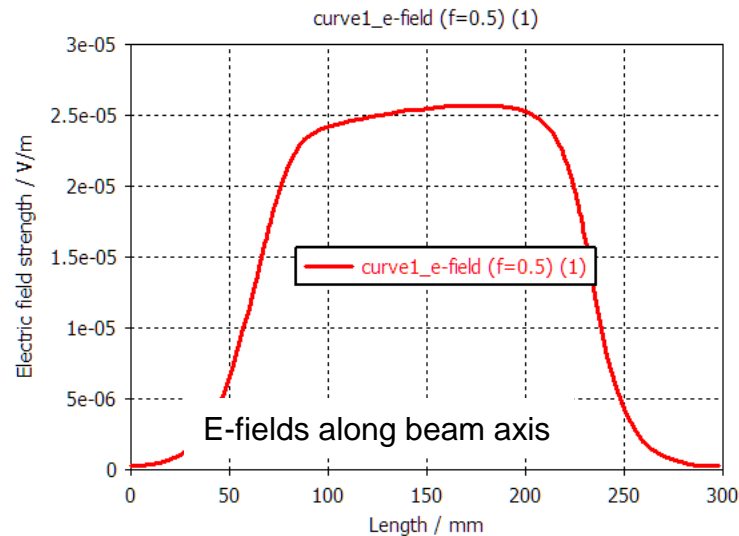
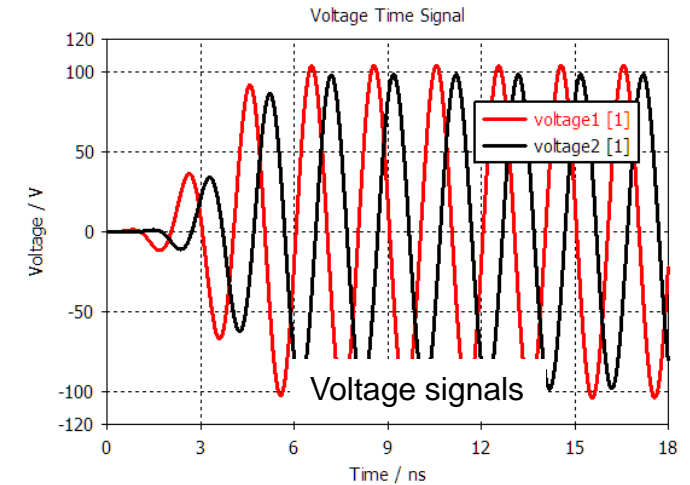
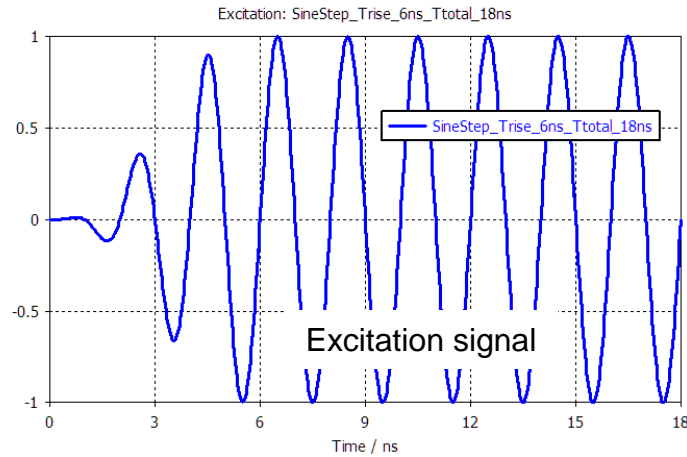
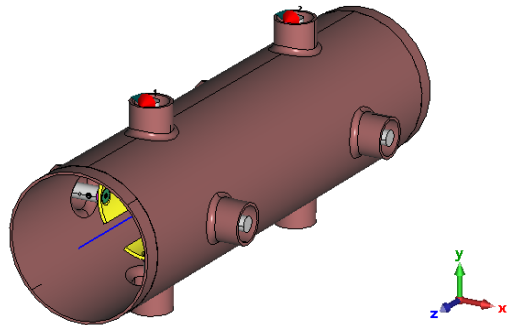
Discrete ports, 8V, sine step signal of 500 MHz

- Used discrete ports with the same signal amplitude (8V)
- Voltages are recoded at the both downstream and upstream ports.



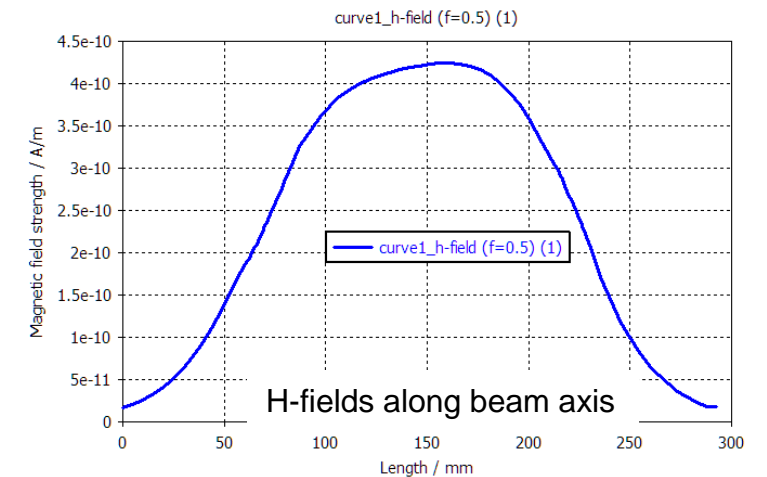
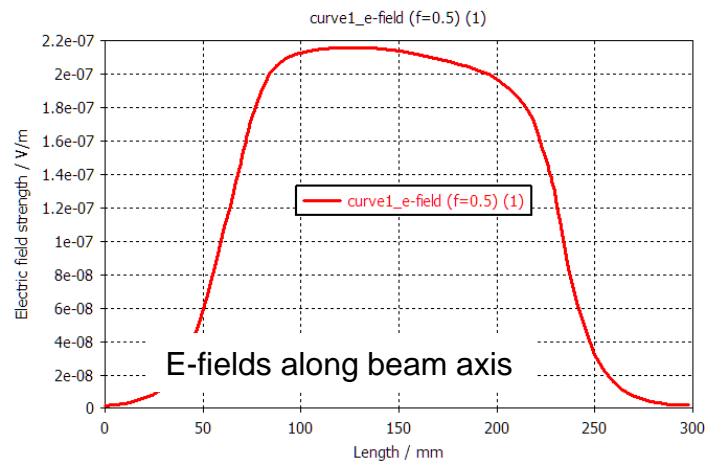
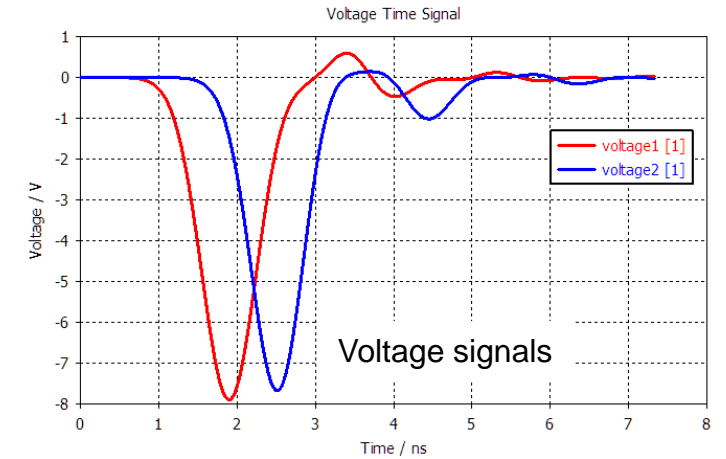
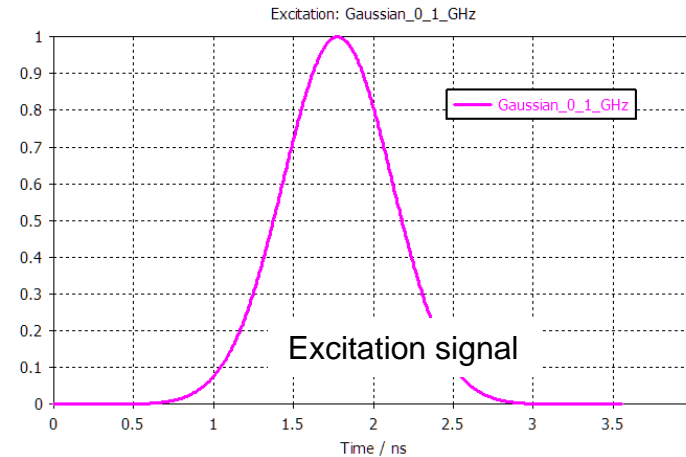
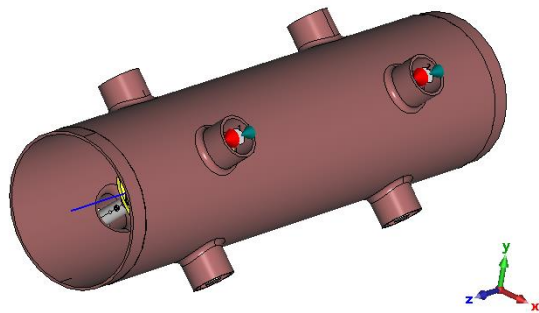
Discrete ports with 100 V, sine step signal

- 100 V amplitude signal



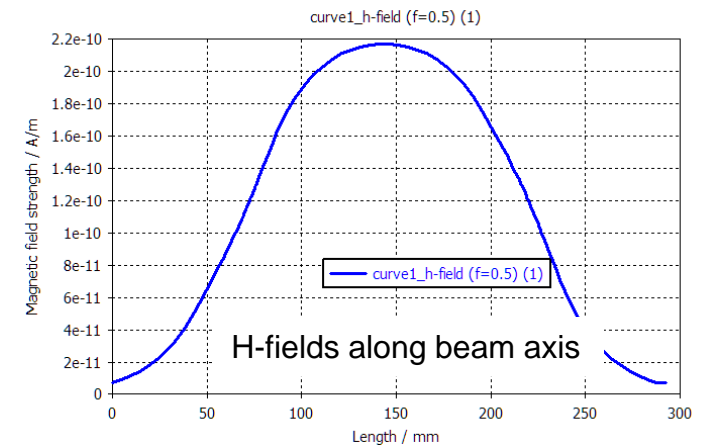
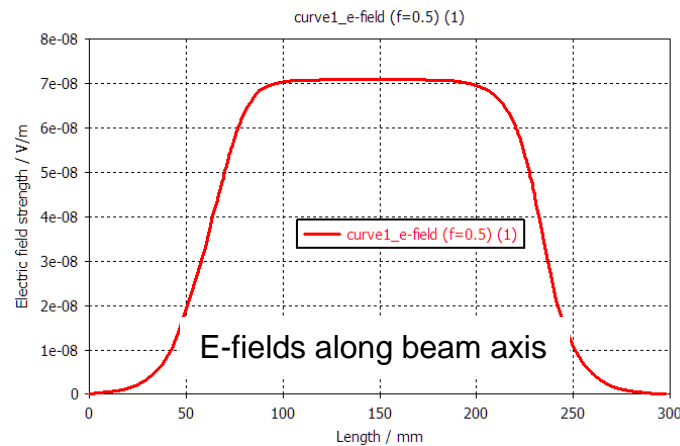
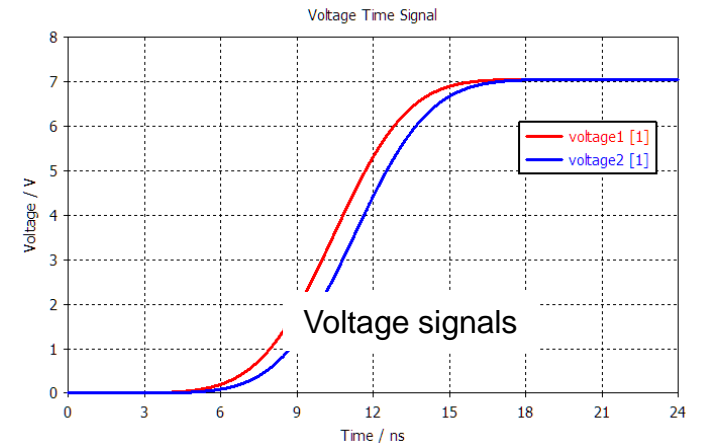
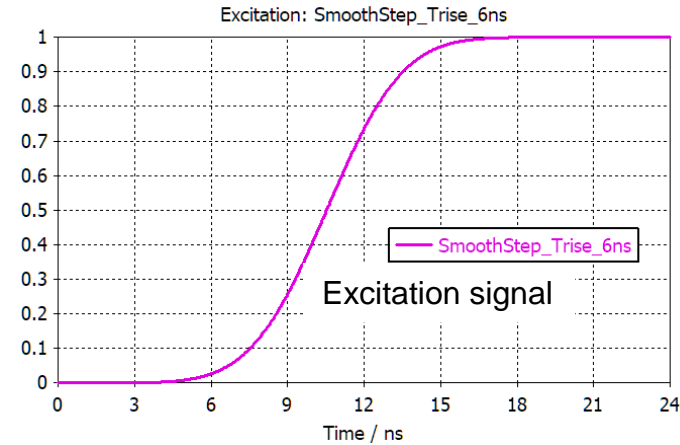
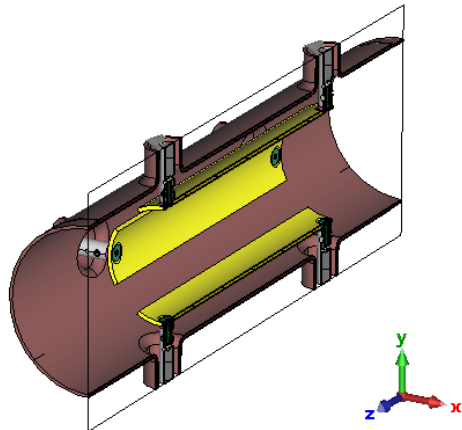
Discrete ports, gaussian signal of 0-1 GHz

- Gaussian signal of 0-1 GHz.
- Voltage recorded has -ve amplitude due to reverse direction of voltage monitors.



Wave-ports, smooth step signal, $T_{\text{rise}} = 6 \text{ ns}$

- Smooth step signal with the rise time of 6 ns.



Summary

- The electric field looks mostly flat in between the electrodes, and decays slowly beyond the electrodes.
- The amplitude of the field obtained from CST seems much lower than that of $E = -dV/dr$ (may be due to AC field).
- The magnetic field is not as flat as that of electric field.