HOM coupler design

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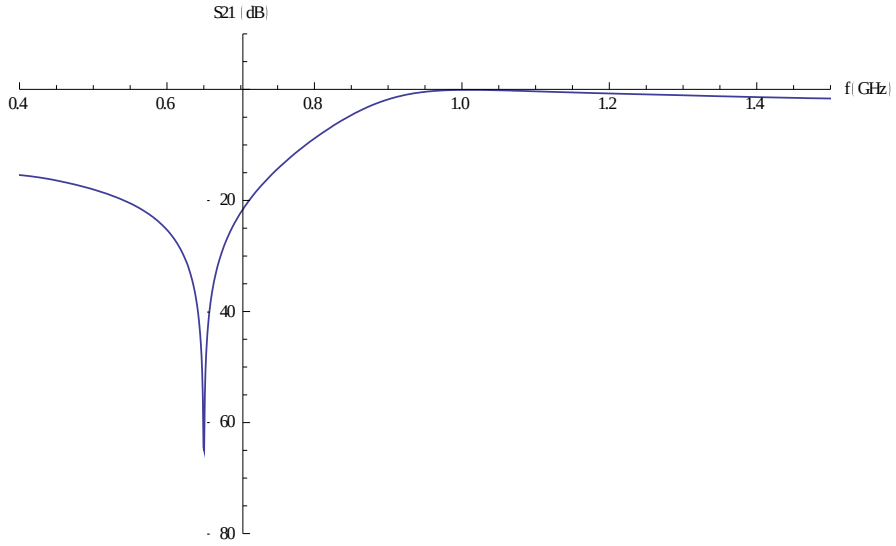
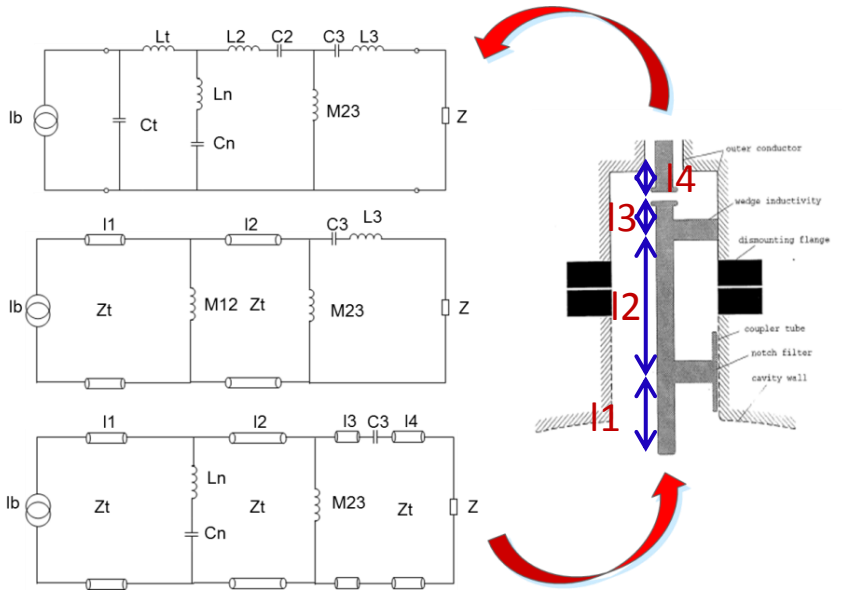
Outline

- Transmission line equivalent circuit results
- First 3D model (without adjustment)
- Next……

Transmission line equivalent circuit results





S21 curve for the circuit equivalent

- Values for the transmission line equivalent circuit：

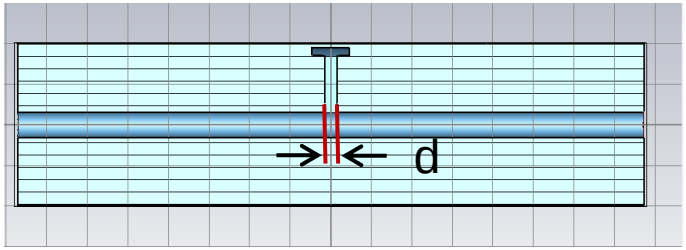
l1=4.77cm, l2=10.17cm, l3=2.0cm, l4=1.0cm, Ln=20.79nH, Cn=2.88pF, M23=8.71nH, C3=1.57pF, Zt=112 Ω, Z=50 Ω

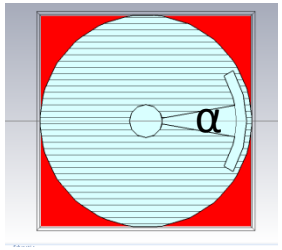
- Outer diameter of the coupling tube is 80mm. Inner diameter of the coupling tube is 12.4 mm.

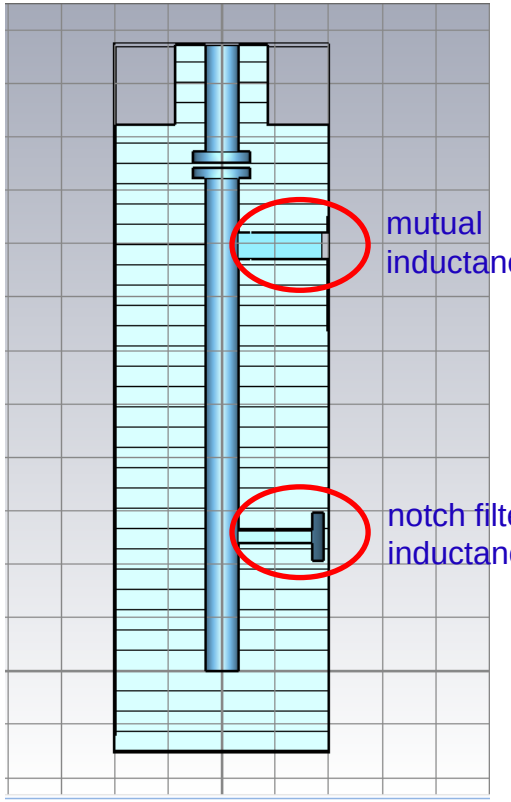
Mutual inductance & notch filter inductance

- decide the geometry and size

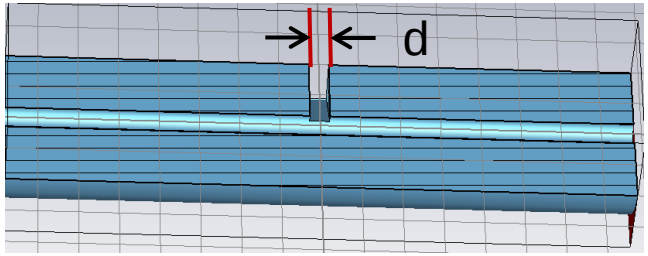
  Using transmission line models to determine the mutual inductance and notch filter inductance.

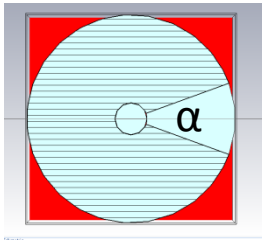






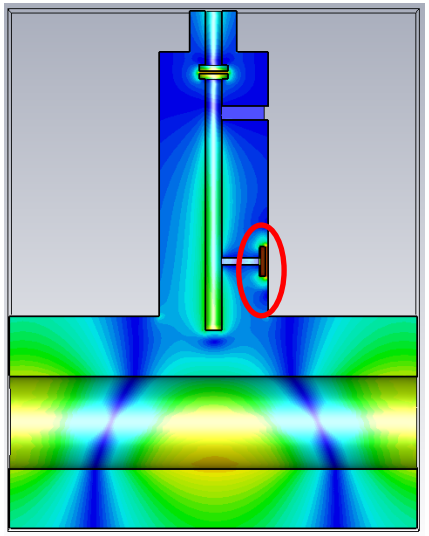
- Design requirement: M12=11.83 nH
- d=5 mm, α=20 deg ⟹ M12=11.925 nH



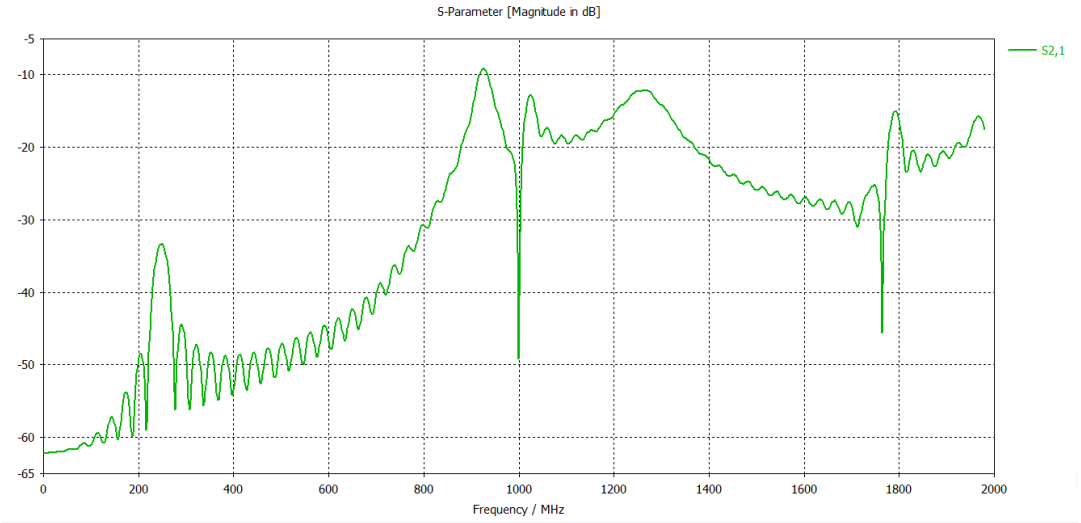


- Design requirement: M23=8.71 nH
- d=10 mm, α=40 deg ⟹ M23=8.957 nH

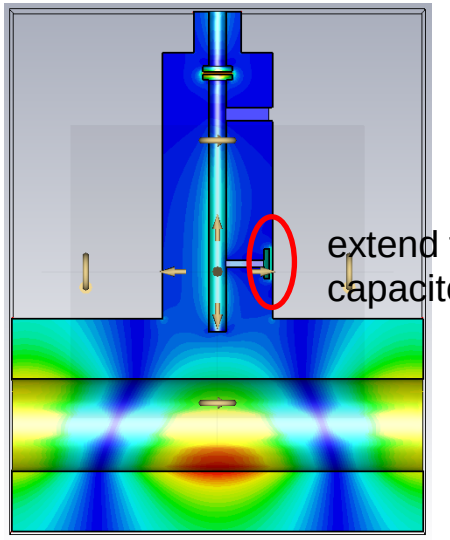
First 3D model (without adjustment)



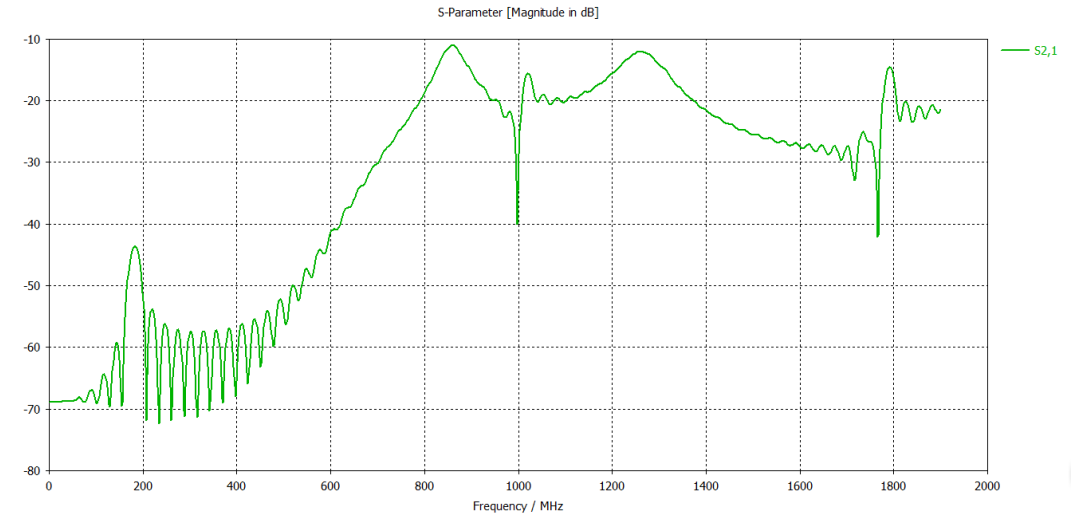
f=989.949 MHz e-field



- The ripple is caused by the time signal not decay to zero.
- CST -- Time Domain Solver, Intel (R) Core (TM) i7-2600 CPU @3.40 GHz, 4 GB RAM, 15 min



extend the capacitor



Difficulty & what to do next ?

- The results of the first 3D model is not good!
- A lot of work need to do:
  - ✓ Calculate *Q*e based on cavity model
  - ✓ Notch filter design (difficulty & key point)
  - ✓ Redesign……


The first step in a long journey!

Compare CST results with HFSS