Model a PBG cavity with the CST Microwave Studio

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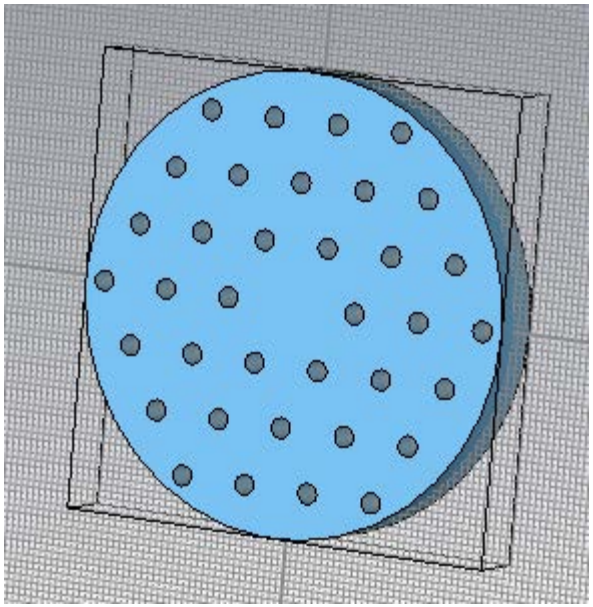
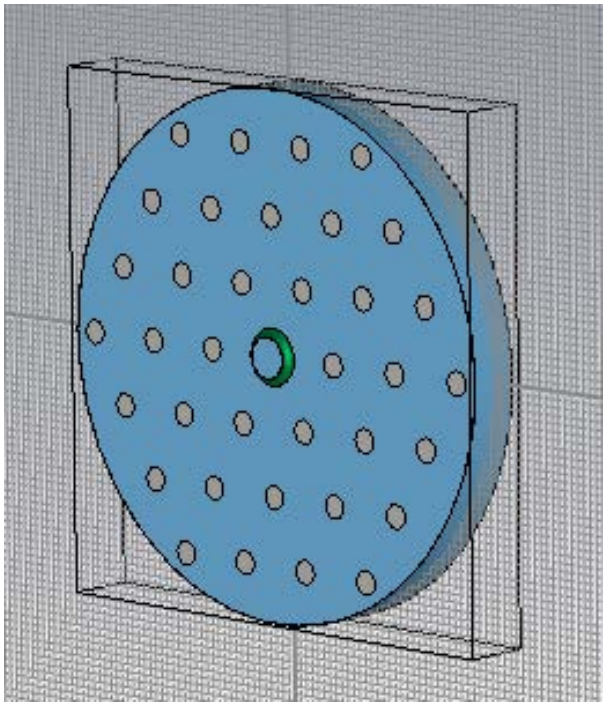
Model for the PBG cavity with no iris

- Draw a large cylindrical cavity with a radius of 33 mm and the length of λ/3.
- Draw a triangular PBG structure of metal rods with the cavity formed by 1 missing central rod.
- Tune the cavity to 11.424. GHz.
- Confirm that the cavity confines the TM01 mode but not the higher order TM11 mode.



Model set up for the PBG cavity with iris

- Draw a large cylindrical cavity:
  - Radius 33 mm.
  - Iris radius 0.1* λ.
  - Iris thickness 2 mm.
  - Cell's length λ/3.
- Draw a triangular PBG structure of metal rods with the cavity formed by 1 missing central rod.
- Tune the cavity to 11.424. GHz.



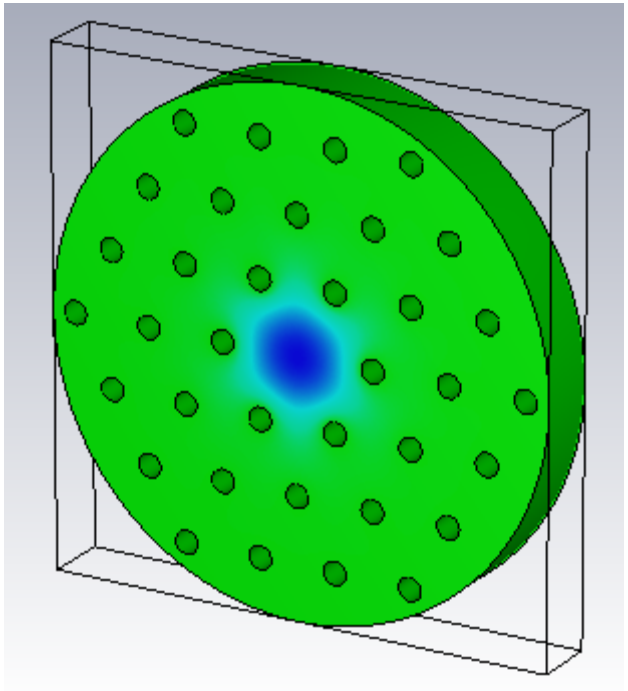
Compute:

- Quality factor Q_0.
- Shunt impedance R_s.
- Accelerating gradient E_a.
- Peak surface electric field E_p.
- Peak surface magnetic field H_p.
- The ratios of E_p/ E_a, Z_0H_p/ E_a.
- Dispersion curve.
- Compare to the similar parameters for the cylindrical cavity.

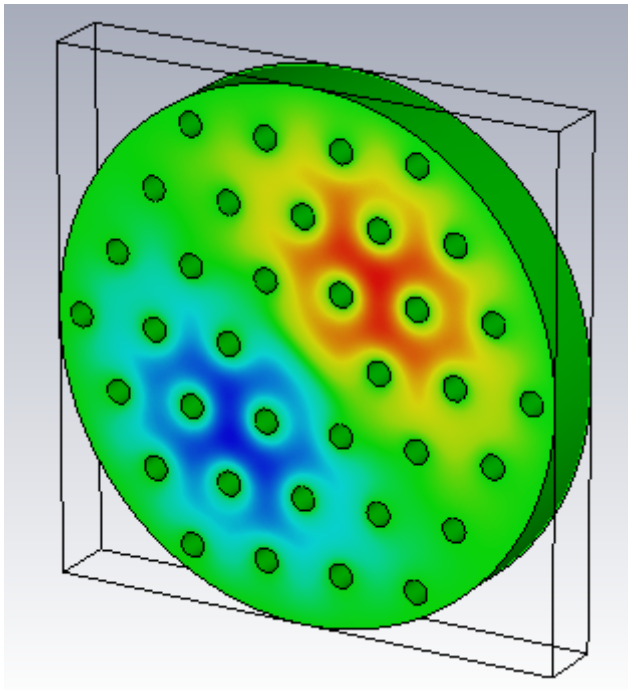
Model for the PBG cavity with no iris

- Optimized period p=10.19 mm.

TM_{01} mode



TM_{11} mode



Model set up for the PBG cavity with iris

- Optimized period: p=10.43 mm.
- Quality factor Q_0=5093
- Shunt impedance R_s=4.82*10^5.
- Voltage V=2.61*10^6. Accelerating gradient E_a= 298 MV/m.
- Peak surface electric field E_p= 697 MV/m.
- Peak surface magnetic field H_p= 2105 kA/m.
- E_p/ E_a=2.33; Z*H_p/ E_a=2.66.

Dispersion for the PBG cavity with iris