Power Coupler Simulations and Cavity Energy Calculation

By

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Coupler simulations

- I have calculated the impedance of coax transition in free space it is 49.91Ω.
- Have checked the effect of short circuit plate distance on S11 with following configurations

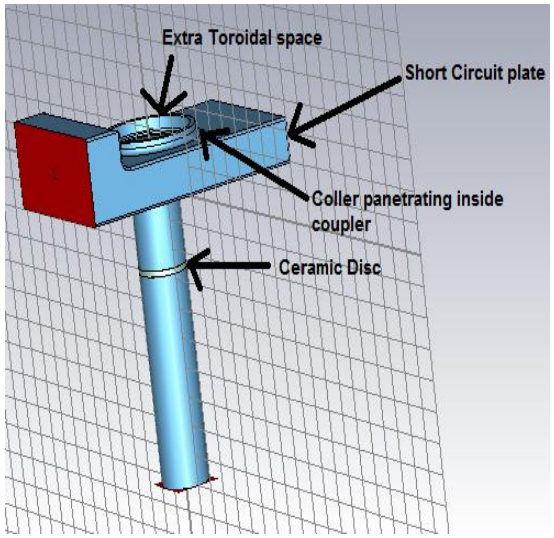
❖ With slots

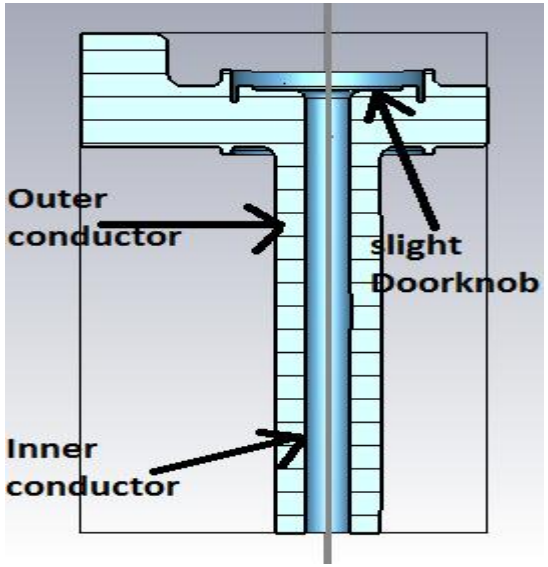
❖ With slots and collar

❖ With slot and collar and ceramic disc

❖ With ceramic disc only

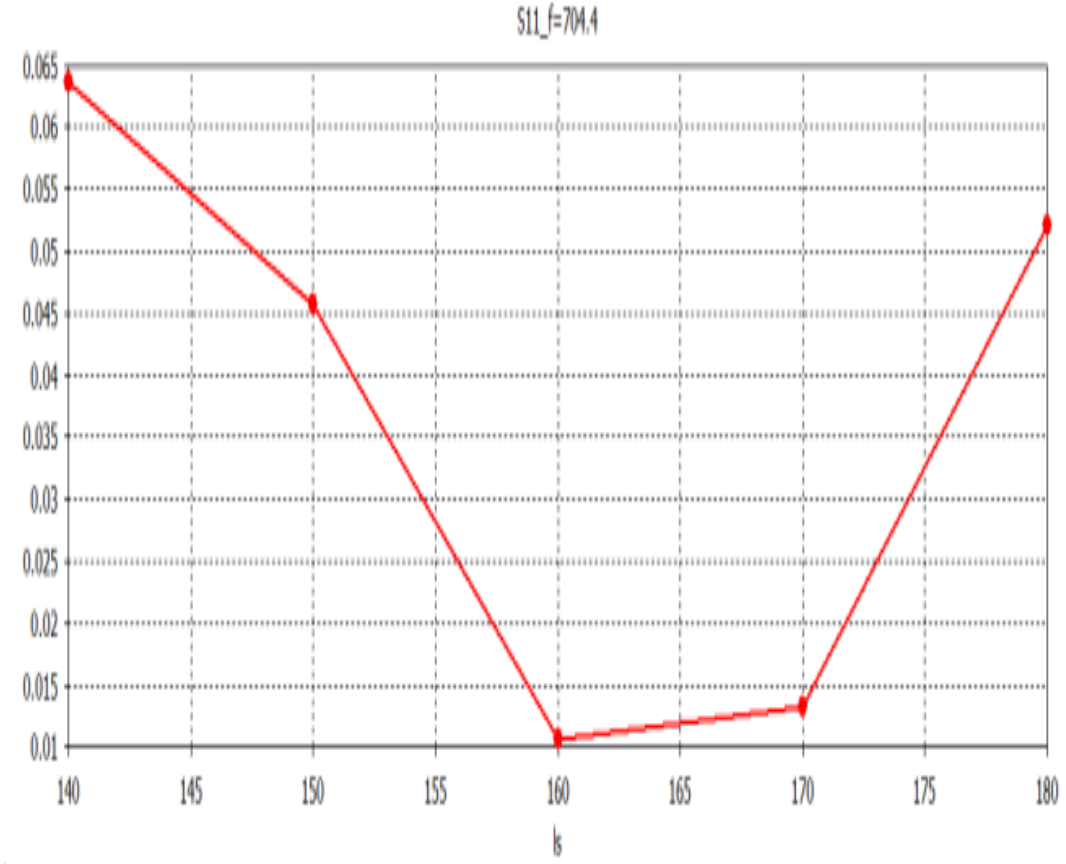
the last one gives the lowest S11

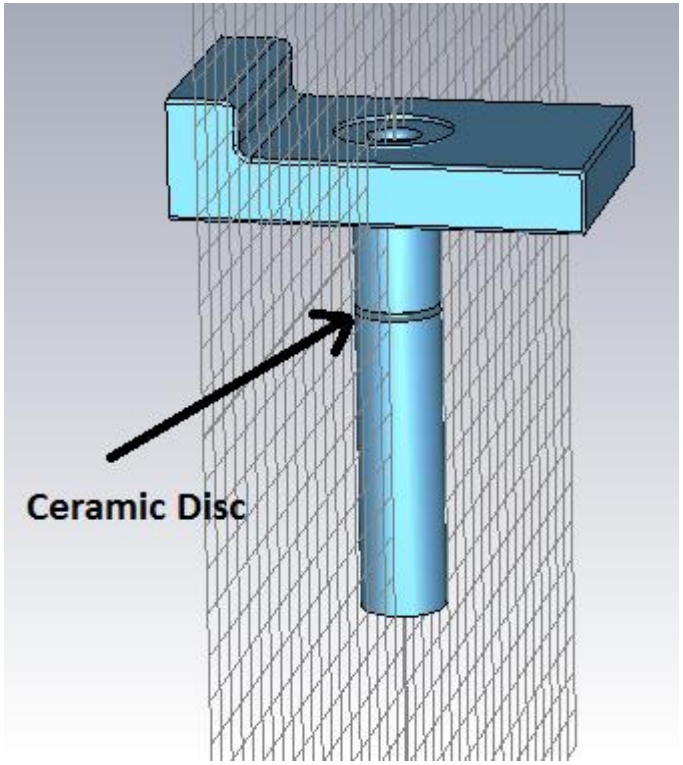




S11 with 10mm ceramic disc only

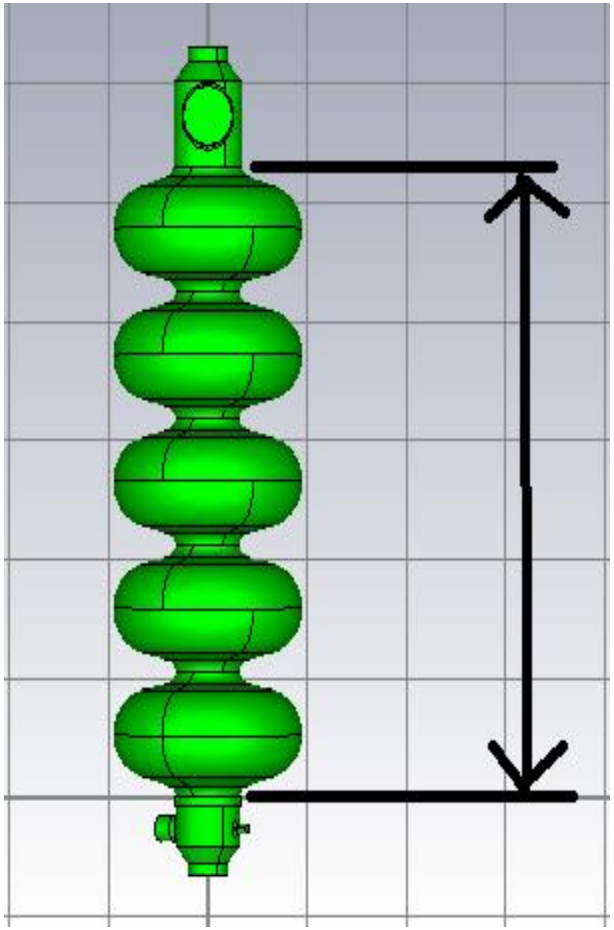
- ls= short circuit plate distance





Energy calculation

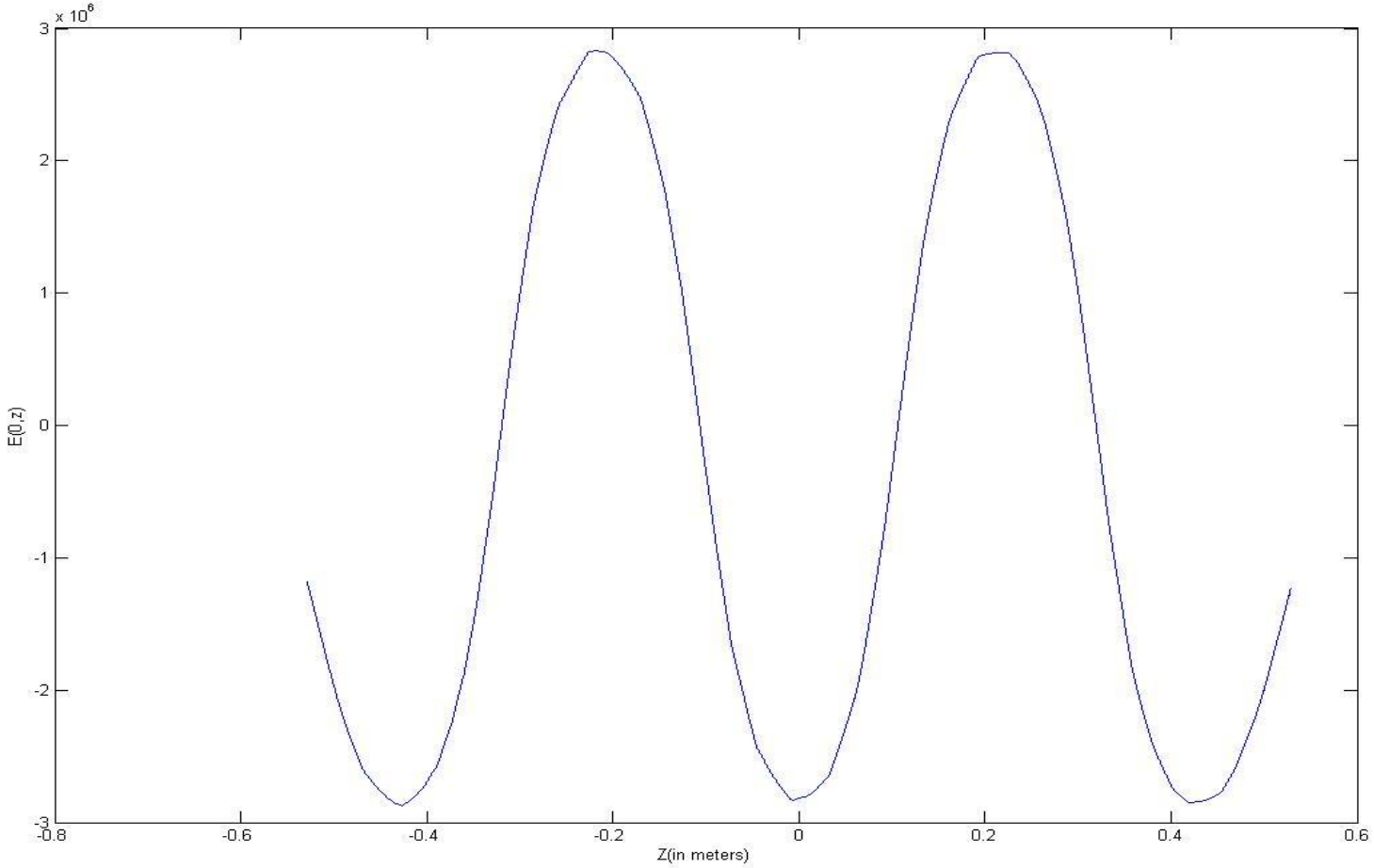
- Dimension of the cavity region are shown in figure, only data points for this region are exported to calculate energy.
- z=0 is taken at 3rd cavity center, which is the geometric center of the bounded region.



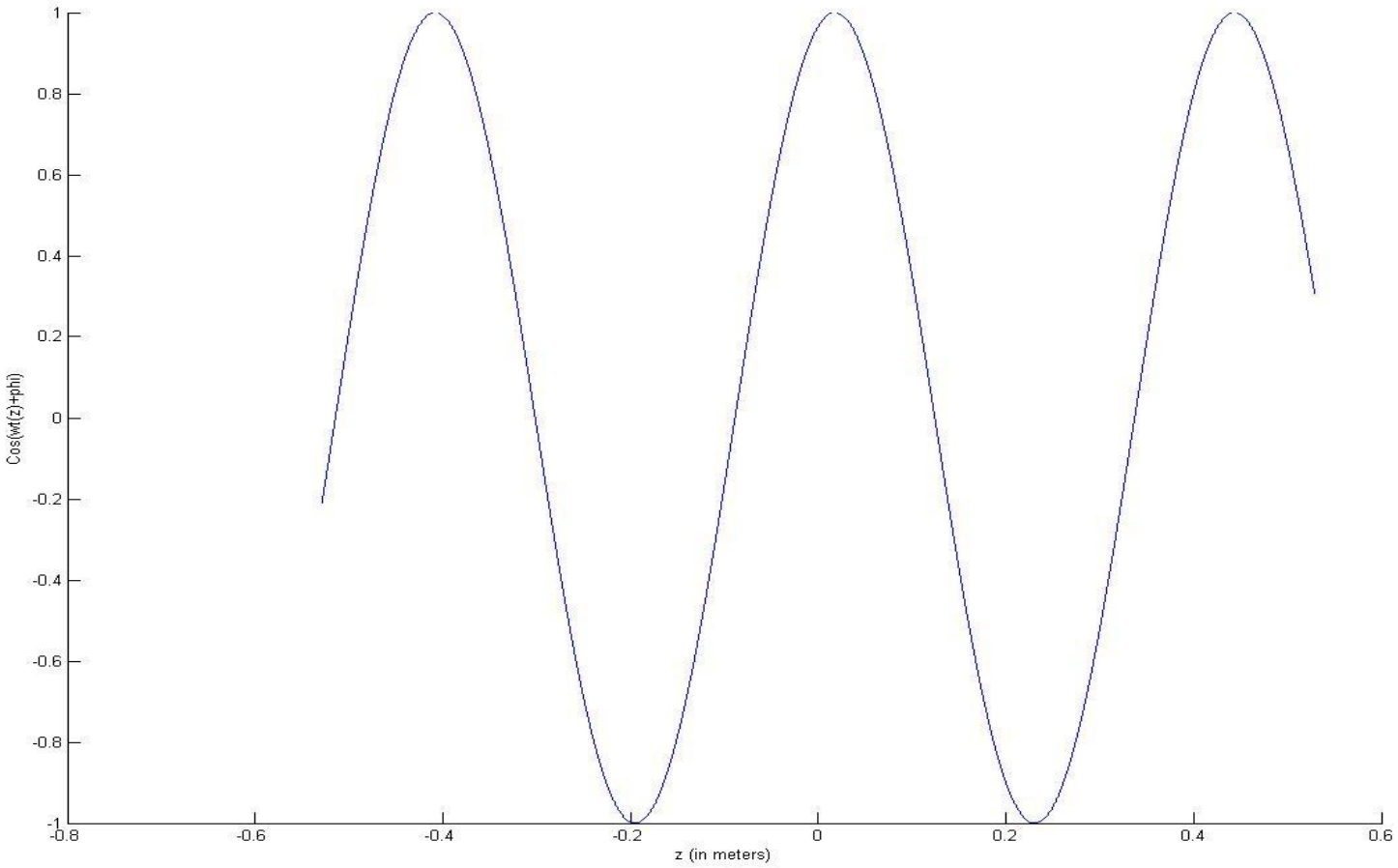
MATLAB program for Energy Calculation

```
Ez=[-1178974.25 ……..];     %10579 data points
[n m]=size(Ez);
z=[-0.52885:0.0001:0.52895]; % for multi-cell cavity z=0 is chosen as the geometric centre of
                the complete system.
C=zeros(n,m);
phi=-pi/12;
for k=1:1:n
C(k)= cos(2*pi/0.4258*z(k)+phi);              % cosine term with phi= -15 degrees
end
dz=0.0001;                                    % step size between two data points 0.0001m=0.1mm
sum=0;
for i=1:1:n
   D(i)=Ez(i)*C(k)*dz;
end
for j=1:1:n
   sum=sum+D(j);      % integration of Ez with cosine term with phi= -15 degrees
end
Sum    % result of integration
plot(z,Ez);
figure;
hold;
plot(z,C);
```

Plot of data points Ez(0,z)



Plot of Cos(ωt(z)+Φ)



Result

- $\int_{-l/2}^{+l/2} E(0,z)dz = -4.7473\ E05$

- $\int_{-l/2}^{+l/2} E(0,z)Cos(\omega t(z) + \varphi) = -1.4504\ E\ 05$