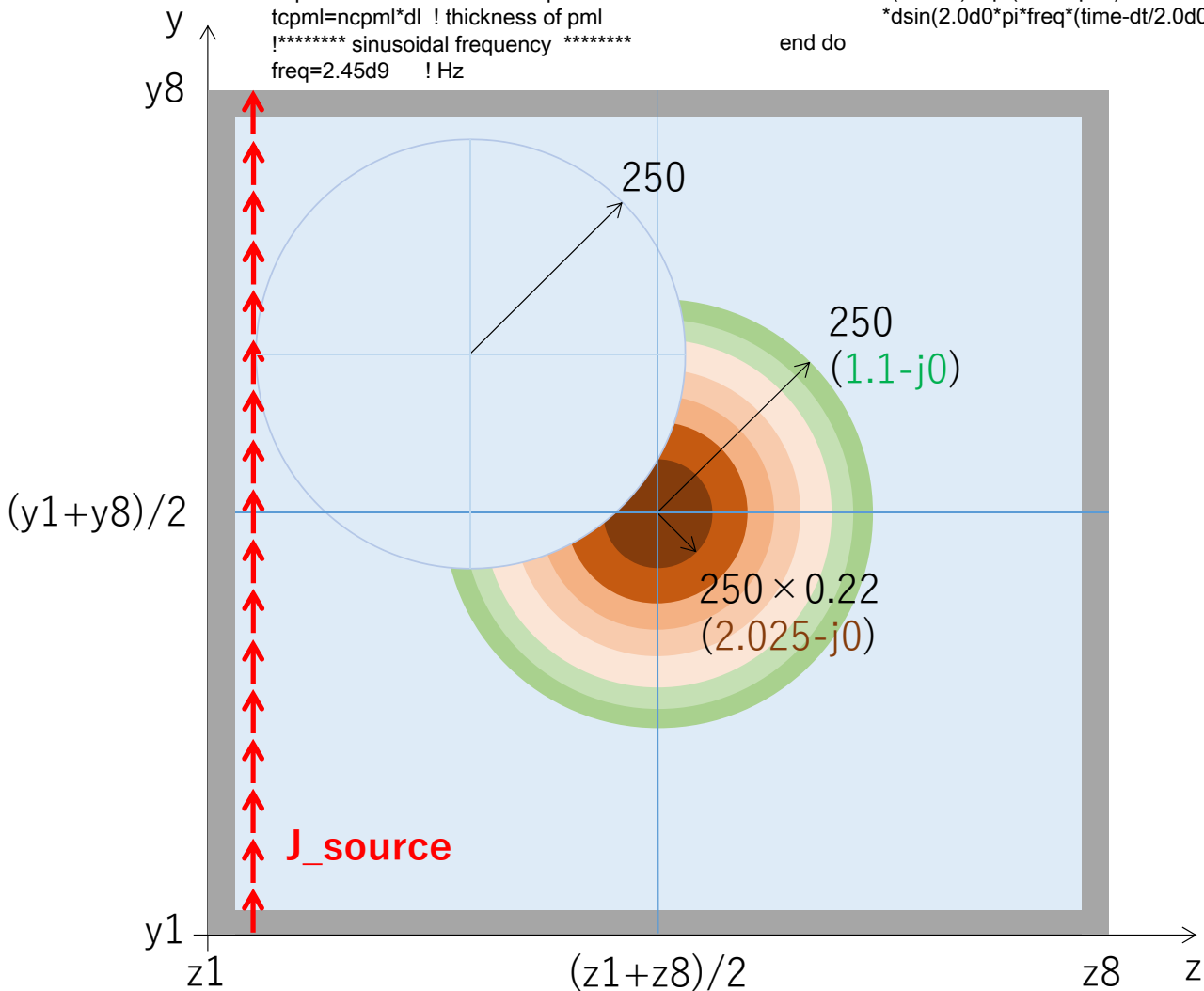


**subroutine media\_coeff\_2dtm**  
! id=0 vacume  
eps(0)=eps0  
sig(0)=0.0d0  
mu(0)=mu0  
! id=1 pec or pmc  
  
! id=2 is dielectric media  
eps(2)=eps0\*(1.1d0)  
sig(2)=omega\*(eps(2)\*0.0d0)  
mu(2)=mu0\*(0.0d0)  
  
! id=3 is dielectric media  
eps(3)=eps0\*(1.25d0)  
sig(3)=omega\*(eps(2)\*0.0d0)  
mu(3)=mu0\*(0.0d0)  
  
! id=4 is dielectric media  
eps(4)=eps0\*(1.325d0)  
sig(4)=omega\*(eps(2)\*0.0d0)  
mu(4)=mu0\*(0.0d0)  
  
! id=5 is dielectric media  
eps(5)=eps0\*(1.58d0)  
sig(5)=omega\*(eps(2)\*0.0d0)  
mu(5)=mu0\*(0.0d0)  
  
! id=6 is dielectric media  
eps(6)=eps0\*(1.75d0)  
sig(6)=omega\*(eps(2)\*0.0d0)  
mu(6)=mu0\*(0.0d0)  
  
! id=7 is dielectric media  
eps(7)=eps0\*(1.85d0)  
sig(7)=omega\*(eps(2)\*0.0d0)  
mu(7)=mu0\*(0.0d0)  
  
! id=8 is dielectric media  
eps(8)=eps0\*(2.025d0)  
sig(8)=omega\*(eps(2)\*0.0d0)  
mu(8)=mu0\*(0.0d0)

**subroutine media\_coeff\_2dtm**  
! circular media 2  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3  
call circular\_media\_2  
  
! circular media 3  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.92  
call circular\_media\_3  
  
! circular media 4  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.83  
call circular\_media\_4  
  
! circular media 5  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.7  
call circular\_media\_5  
  
! circular media 6  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.55  
call circular\_media\_6  
  
! circular media 7  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.4  
call circular\_media\_7  
  
! circular media 8  
jcent=nint((yi(1)+yi(8))/2.0)  
kcent=nint((zi(1)+zi(8))/2.0)  
radius=250.0d-3\*0.22  
call circular\_media\_8

v1.2 Mar.2016  
 Luneburg lens  
 with deficit



```

subroutine lattice_time_2dtm
!***** lattice widths *****
dl=2.0d-3
dy=dl
dz=dl
!***** number of cells in pml (ncpml) *****
ncpml=8 ! number of cell in pml
tcpml=ncpml*dl ! thickness of pml
!***** sinusoidal frequency *****
freq=2.45d9 ! Hz

```

```

subroutine j_source_2dtm
do j=yi(1),yi(8)-1 ! for z propagation
k=zi(2)+2
id=id_ey(j,k)
ey(j,k)=ey(j,k) &
-(dt/eps(id))/(1+(sig(id)*dt/(2.0d0*eps(id)))) &
*(-2.0d0)/sqrt(mu0/eps0)/dz & ! J [A/m2]
*dsin(2.0d0*pi*freq*(time-dt/2.0d0))
end do

```

```

subroutine media_coeff_2dtm
! id=0 vacume
eps(0)=eps0
sig(0)=0.0d0
mu(0)=mu0
! id=1 pec or pmc

! id=2 is dielectric media
eps(2)=eps0*(1.1d0)
sig(2)=omega*(eps(2)*0.0d0)
mu(2)=mu0*(0.0d0)

! id=3 is dielectric media
eps(3)=eps0*(1.25d0)
sig(3)=omega*(eps(2)*0.0d0)
mu(3)=mu0*(0.0d0)

! id=4 is dielectric media
eps(4)=eps0*(1.325d0)
sig(4)=omega*(eps(2)*0.0d0)
mu(4)=mu0*(0.0d0)

! id=5 is dielectric media
eps(5)=eps0*(1.58d0)
sig(5)=omega*(eps(2)*0.0d0)
mu(5)=mu0*(0.0d0)

! id=6 is dielectric media
eps(6)=eps0*(1.75d0)
sig(6)=omega*(eps(2)*0.0d0)
mu(6)=mu0*(0.0d0)

! id=7 is dielectric media
eps(7)=eps0*(1.85d0)
sig(7)=omega*(eps(2)*0.0d0)
mu(7)=mu0*(0.0d0)

! id=8 is dielectric media
eps(8)=eps0*(2.025d0)
sig(8)=omega*(eps(2)*0.0d0)
mu(8)=mu0*(0.0d0)

```

```

subroutine media_coeff_2dtm
! circular media 2
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3
call circular_media_2
! circular media 3
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.92
call circular_media_3
! circular media 4
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.83
call circular_media_4
! circular media 5
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.7
call circular_media_5
! circular media 6
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.55
call circular_media_6
! circular media 7
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.4
call circular_media_7
! circular media 8
jcent=nint((yi(1)+yi(8))/2.0)
kcent=nint((zi(1)+zi(8))/2.0)
radius=250.0d-3*0.22
call circular_media_8
! circular media 0
jcent=nint((yi(1)+yi(8))/4.0)
kcent=nint((zi(1)+zi(8))/4.0)
radius=250.0d-3*0.8
call circular_media_0

```