v1.2 Mar.2016

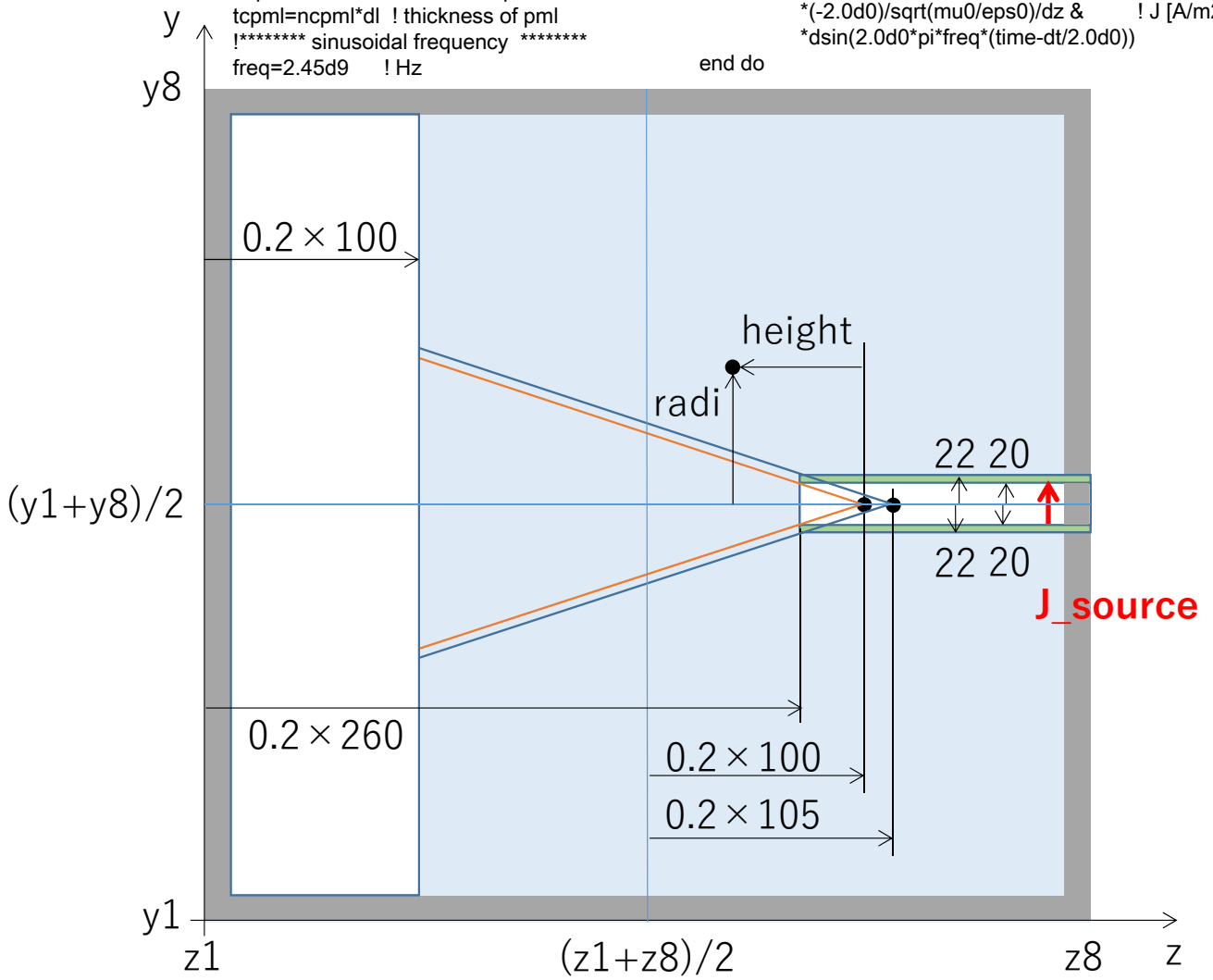
Horn antenna
Transmitting

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=nint((yi(1)+yi(8))/2.0)-nint(20.0d-3/dy),&
       nint((yi(1)+yi(8))/2.0)+nint(20.0d-3/dy)-1
k=zi(7)-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,pmc (no define, see <e-field> or <h-field> )

 ! triangle media
   jcent=nint((yi(1)+yi(8))/2.0)
   kcent=nint((zi(1)+zi(8))/2.0)+100
   slope=20.0d0
   call triangle_media

   ! triangle media
   jcent=nint((yi(1)+yi(8))/2.0)
   kcent=nint((zi(1)+zi(8))/2.0)+105
   slope=20.0d0
   call triangle_media_0

   ! rectangular media
   mys=yi(1)
   mye=yi(8)
   mzs=zi(1)
   mze=zi(1)+100
   call rectangular_media

   ! rectangular media
   mys=nint((yi(1)+yi(8))/2.0)-nint(22.0d-3/dy)
   mye=nint((yi(1)+yi(8))/2.0)+nint(22.0d-3/dy)
   mzs=zi(1)+260
   mze=zi(8)
   call rectangular_media_1

   ! rectangular media
   mys=nint((yi(1)+yi(8))/2.0)-nint(20.0d-3/dy)
   mye=nint((yi(1)+yi(8))/2.0)+nint(20.0d-3/dy)
   mzs=zi(1)+260
   mze=zi(8)
   call rectangular_media
```

subroutine triangle_media

```
  do k=1,iz-1
    do j=1,iy
      radi=sqrt(((j-jcent)*dy)**2)
      heit=sqrt(((k-kcent)*dy)**2)
      if(radi >= heit*tan(slope*pi/180.0d0)) then
        id_ez(j,k)=1
      end if
    end do
  end do
  do k=1,iz
    do j=1,iy-1
      radi=sqrt(((j-jcent)*dy)**2)
      heit=sqrt(((k-kcent)*dy)**2)
      if(radi >= heit*tan(slope*pi/180.0d0)) then
        id_ey(j,k)=1
      end if
    end do
  end do

end subroutine triangle_media
```

v1.2 Mar.2016

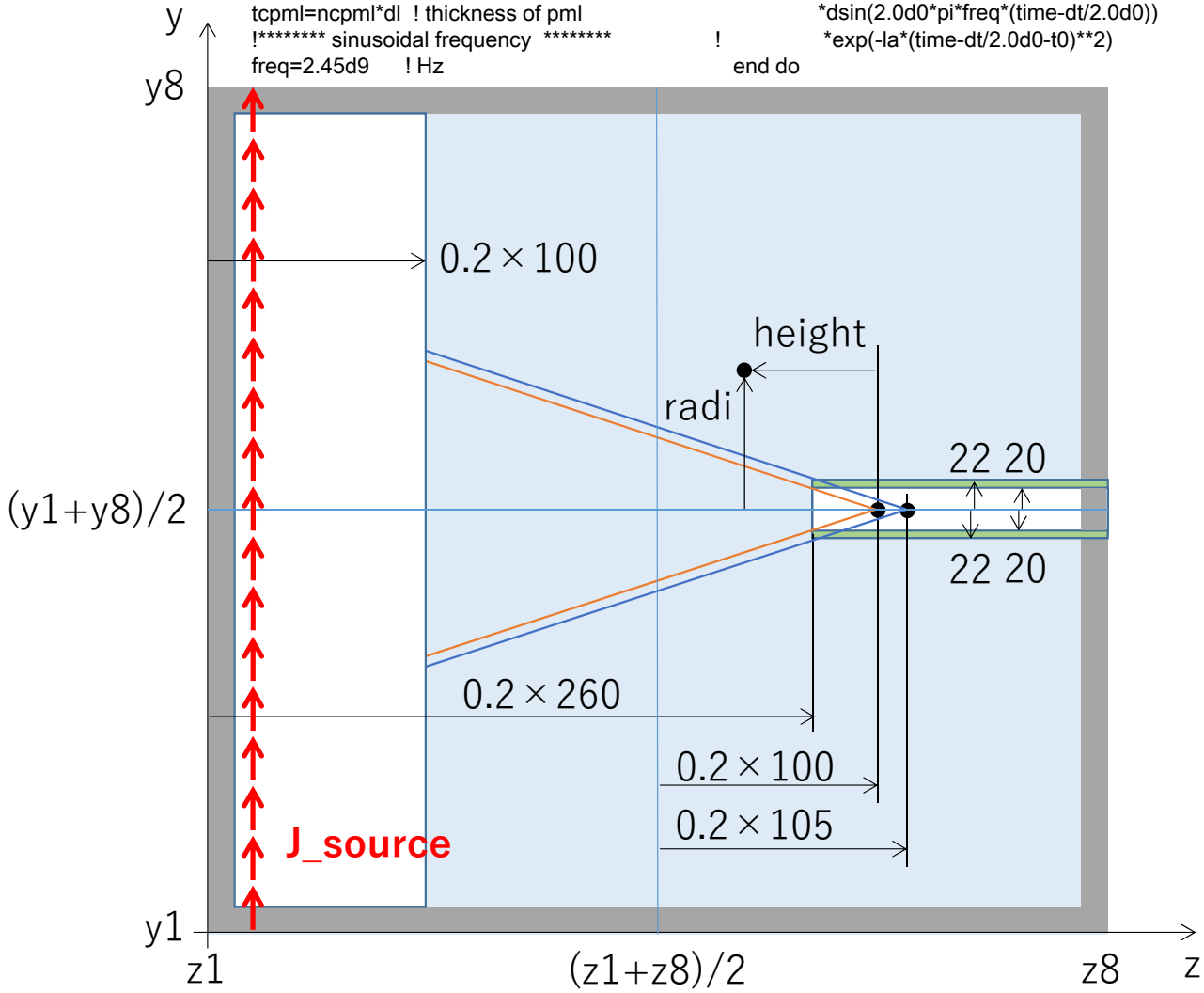
Horn antenna
Receiving

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))
!            *exp(-la*(time-dt/2.0d0-t0)**2)
  end do
```



subroutine media_coeff_2dtm

```
 ! id=0 vacume
  eps(0)=eps0
  sig(0)=0.0d0
  mu(0)=mu0
  ! id=1 pec,pmc (no define, see <e-field> or <h-field> )

 ! triangle media
  jcent=nint((yi(1)+yi(8))/2.0)
  kcent=nint((zi(1)+zi(8))/2.0)+100
  slope=20.0d0
  call triangle_media

  ! triangle media
  jcent=nint((yi(1)+yi(8))/2.0)
  kcent=nint((zi(1)+zi(8))/2.0)+105
  slope=20.0d0
  call triangle_media_0

  ! rectangular media
  mys=yi(1)
  mye=yi(8)
  mzs=zi(1)
  mze=zi(1)+100
  call rectangular_media

  ! rectangular media
  mys=nint((yi(1)+yi(8))/2.0)-nint(22.0d-3/dy)
  mye=nint((yi(1)+yi(8))/2.0)+nint(22.0d-3/dy)
  mzs=zi(1)+260
  mze=zi(8)
  call rectangular_media_1

  ! rectangular media
  mys=nint((yi(1)+yi(8))/2.0)-nint(20.0d-3/dy)
  mye=nint((yi(1)+yi(8))/2.0)+nint(20.0d-3/dy)
  mzs=zi(1)+260
  mze=zi(8)
  call rectangular_media
```

subroutine triangle_media

```
  do k=1,iz-1
    do j=1,iy
      radi=sqrt(((j-jcent)*dy)**2)
      heit=sqrt(((k-kcent)*dy)**2)
      if(radi >= heit*tan(slope*pi/180.0d0)) then
        id_ez(j,k)=1
      end if
    end do
  end do
  do k=1,iz
    do j=1,iy-1
      radi=sqrt(((j-jcent)*dy)**2)
      heit=sqrt(((k-kcent)*dy)**2)
      if(radi >= heit*tan(slope*pi/180.0d0)) then
        id_ey(j,k)=1
      end if
    end do
  end do

end subroutine triangle_media
```