In [2]:
```
%load_ext autoreload
%autoreload 2

import sys
sys.path.append("../src")

import numpy as np
from axitra import *
import matplotlib.pyplot as pt
#%matplotlib notebook
```

Test amplitude for a point source seen in the far-field

Parameters for receiver and source

In [3]:
```
# ---------------------------------
# 1 source at center and depth 5 km
# ---------------------------------
sources=np.array([[1, 0.0, 0.000, 5000.000]])
# We set a strike-slip fault aligned along the source-receiver direction
M0=7.5e20 # Seismic moment
strike = 0.
dip = 90.
rake = 0.
hist = np.array([[1,M0,strike,dip,rake,0.,0.,0.0]])

# ---------------------------------
# 1 receiver at surface along North axis at X km
# ---------------------------------
X = 50000
stations=np.array([[1, X, 0.000, 0.000]])

dist = np.linalg.norm(sources[0,1:4]-stations[0,1:4])
print('distance is ',dist, 'meters')

# ---------------------------------
# 1 layer
# ---------------------------------
# thickness (or top), Vp, Vs, rho, Qp, Qs
rho = 2700.  #density
beta = 2886. #Vs
model = np.array([[00., 5000., beta, rho, 1000., 1000.]])
```

```
distance is  50249.37810560445 meters
```

Low frequency asymptotic level

In [4]:
```
# ---------------------------------
# We expect the low frequency asymptote to be equal to : M0 /r  / (4*pi*rho*bet
a^3)
# ---------------------------------
LowFreq_asympt = M0* 1./(4.*np.pi*rho*beta**3) / dist
print('Low frequency asymptote ',LowFreq_asympt)
```

```
Low frequency asymptote  18.300711037909867
```

Run Green's function calculation

In [6]:
```
# Fill in the instance of Axitra Class
ap = Axitra(model, stations, sources, fmax=20., duration=50., xl=500000., latlo
n=False,freesurface=False,axpath='../src')

# Compute green's function
ap = moment.green(ap)
```

```
../src/axitra ran sucessfully
```

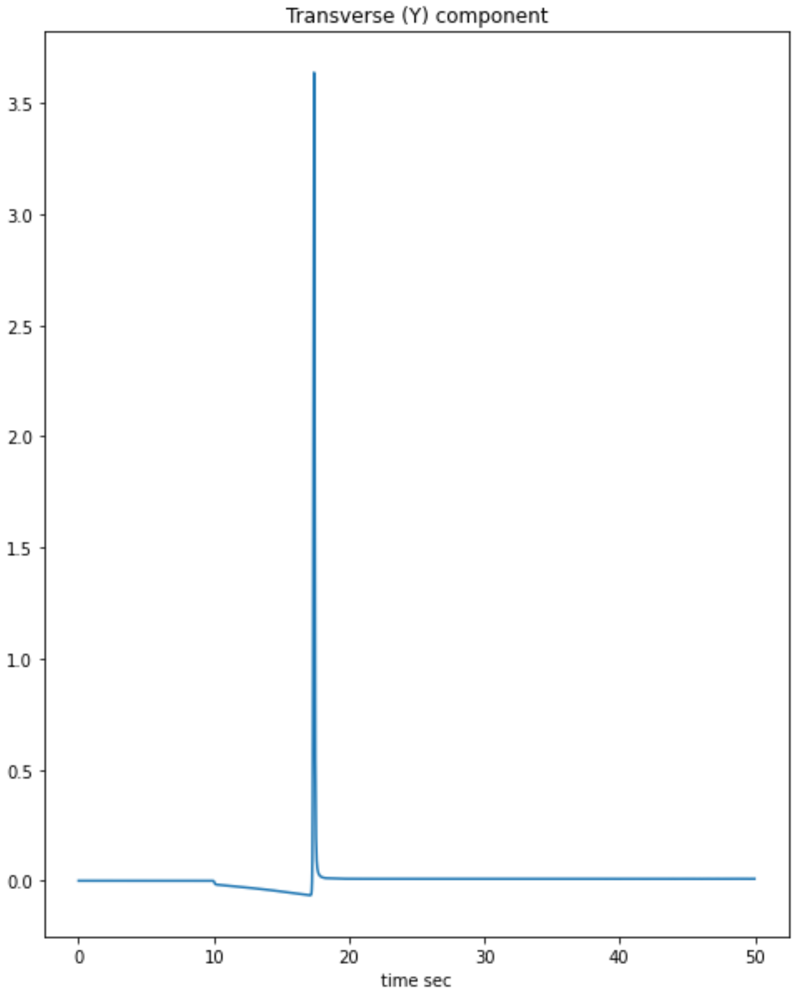
Compute convolution for different source time function

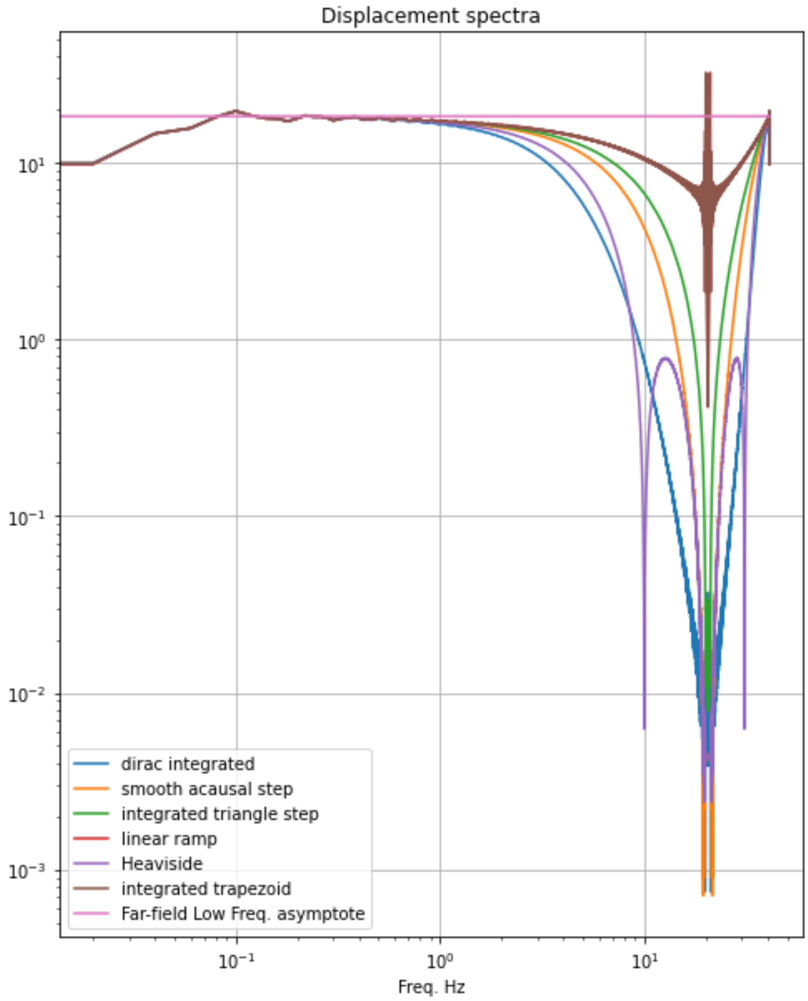
In [9]:
```
# ---------------------------------
# 0: dirac source and output is an integration of displacement
# 2: smooth acausal step
# 4: step as an integral of a triangle
# 5: step with a linear ramp
# 7: Heaviside
# 8: step as an integral of a trapezoid
# ---------------------------------
t, sx_0, sy_0, sz_0 = moment.conv(ap,hist,source_type=0,t0=0.05,unit=0)
t, sx_2, sy_2, sz_2 = moment.conv(ap,hist,source_type=2,t0=0.05,unit=1)
t, sx_4, sy_4, sz_4 = moment.conv(ap,hist,source_type=4,t0=0.05,unit=1)
t, sx_5, sy_5, sz_5 = moment.conv(ap,hist,source_type=5,t0=0.05,unit=1)
t, sx_7, sy_7, sz_7 = moment.conv(ap,hist,source_type=7,t0=0.05,unit=1)
t, sx_8, sy_8, sz_8 = moment.conv(ap,hist,source_type=8,t0=0.05,t1=0.1,unit=1)
```

Plot results

In [10]:
```
pt.figure(figsize=(8, 10))
#pt.subplot(2,1,1)
ier = pt.plot(t,sy_2[0,:])
pt.xlabel('time sec')
pt.title('Transverse (Y) component')
pt.show()

pt.figure(figsize=(8, 10))
#pt.subplot(2,1,2)
pt.xlabel('Freq. Hz')
pt.title('Displacement spectra')
pt.grid()
nfreq = t.size
df=1./t[-1]
f = np.arange(0,nfreq)*df
pt.loglog(f, np.abs(np.fft.fft(sy_2[0,:])), f, np.abs(np.fft.fft(sy_4[0,:])),
          f, np.abs(np.fft.fft(sy_5[0,:])),f, np.abs(np.fft.fft(sy_7[0,:])),
          f, np.abs(np.fft.fft(sy_8[0,:])), f, np.abs(np.fft.fft(sy_0[0,:])),
          f, f*0.+LowFreq_asympt)
pt.legend(['dirac integrated','smooth acausal step','integrated triangle step',
           'linear ramp','Heaviside','integrated trapezoid','Far-field Low Fre
q. asymptote']);
```


Transverse (Y) component
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
10
20
30
40
50
time sec


Displacement spectra
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-1}
10^0
10^1
Freq. Hz
dirac integrated
smooth acausal step
integrated triangle step
linear ramp
Heaviside
integrated trapezoid
Far-field Low Freq. asymptote