

# Model 1 (Ultrasounds)

## Homogeneous halfspace

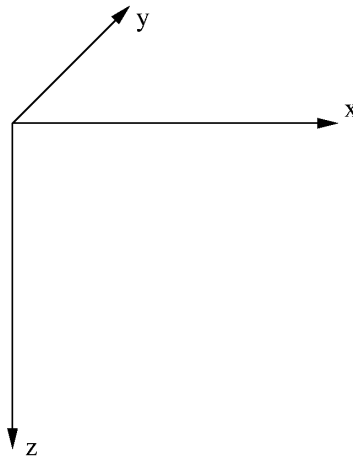
### Coordinate System

Left handed cartesian coordinate system (see Fig. 1).

All vector components point into the direction of the corresponding coordinate axis. (For example a positive force acts downwards and vertical velocity seismograms are positive for downward movement.)

All coordinates are in meters.

The free surface coincides with the plane  $z=0$ .



**Figure 1:** Used coordinate system.

### Material Properties

Homogeneous elastic halfspace. The material parameters are given in Tab. 1.

	$v_p$ in km/s	$v_s$ in km/s	density in g/cm <sup>3</sup>	$Q_p$	$Q_s$
halfspace	2.73	1.43	1.8	inf	inf

**Table 1:** Material parameters.

### Source

Vertical point force with the force time function:

$$s(t) = \begin{cases} 0 & \text{for } t \leq Ts, \\ F_0 \sin^3\left(\frac{\pi(t-Ts)}{Td}\right) & \text{for } Ts < t < Ts + Td, \\ 0 & \text{for } t \geq Ts + Td. \end{cases}$$

with the following parameters used for the modellings:

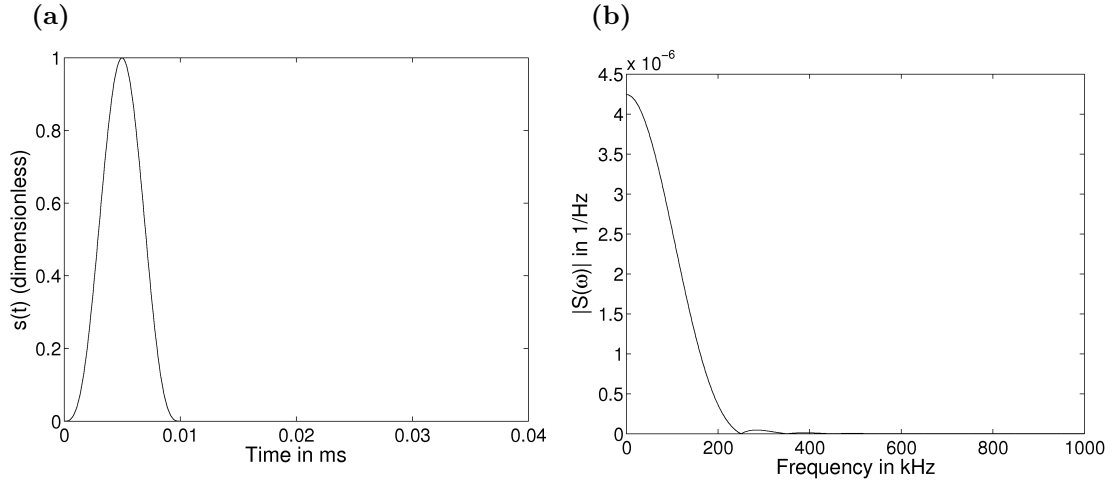
$Ts=0.0$  ms (time of source onset)

$Td=0.010$  ms (duration of source signal)

$F_0=1$  N (scalar force)

The used source time function (without including the factor  $F_0$ ) and the corresponding amplitude spectrum are plotted in Fig. 2.

The coordinates of the source are:  
 $x = 0$  mm,  $y = 0$  mm,  $z = 0$  mm.



**Figure 2:** Force time function used for the modellings. In (a) the wavelet is plotted in the time domain and in (b) the corresponding amplitude spectrum is shown.

## Receivers

11 equidistant receivers at a distance of 10 mm from each other. The receivers are located at the free surface.

The explicit coordinates are given in Tab. 2.

## Time Window

Time window for all receivers is 0 s to 0.0004096 s.

## Frequency Range

The modellings should be accurate for the whole frequency range given by the source time function.

## Output Information

Time histories of particle velocities for  $x$ ,  $y$  and  $z$  component (in m/s) for all receivers.

Required time step is  $1.0\text{e-}7$  s.

No.	$x$ in mm	$y$ in mm	$z$ in mm
1	62	0	0
2	72	0	0
3	82	0	0
4	92	0	0
5	102	0	0
6	112	0	0
7	122	0	0
8	132	0	0
9	142	0	0
10	152	0	0
11	162	0	0

**Table 2:** Receiver coordinates.