

# Model 1 (shallow seismics)

## Homogeneous halfspace

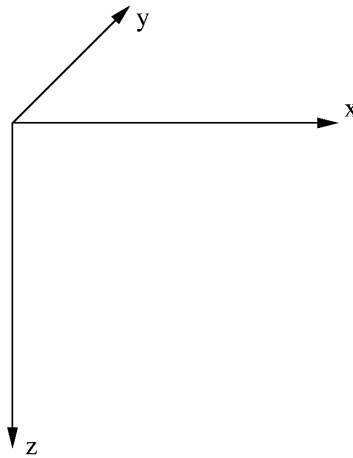
### Coordinate System

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 m/s	$v_s$ in m/s	density in $\text{kg/m}^3$	$Q_p$	$Q_s$
halfspace	500	300	1800	inf	inf

**Table 1:** Material parameters.

### Source

Vertical point force with the force time function:

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

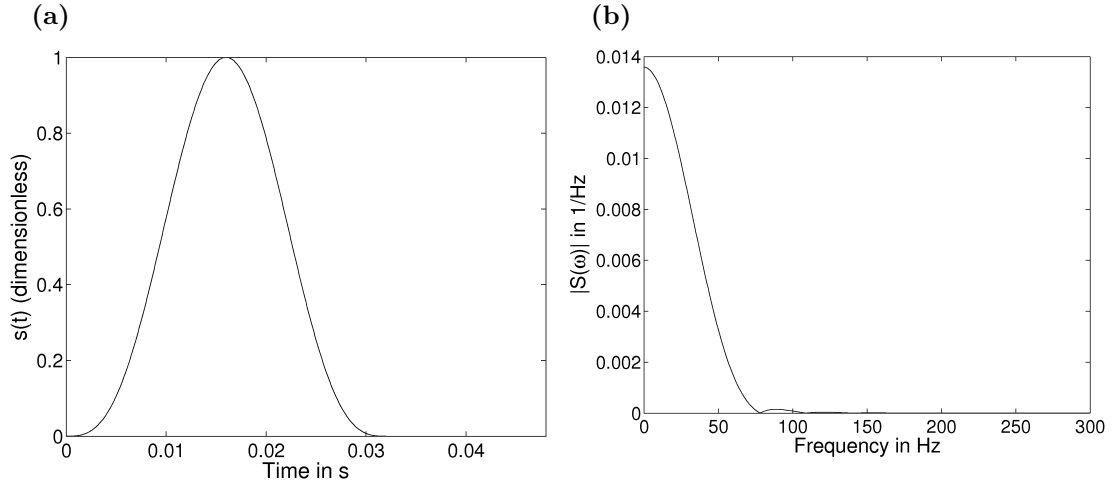
with the following parameters used for the modellings:

$Ts=0\text{s}$  (time of source onset)

$Td=32$  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 source is located at the origin of the coordinate system.



**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

24 equidistant receivers with a minimum offset (source receiver distance) of 1 m and a maximum offset of 70 m. The receiver distance is 3 m. 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 0.3995 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 0.5 ms.

No.	$x$ in m	$y$ in m	$z$ in m	No.	$x$ in m	$y$ in m	$z$ in m
1	1	0	0	13	37	0	0
2	4	0	0	14	40	0	0
3	7	0	0	15	43	0	0
4	10	0	0	16	46	0	0
5	13	0	0	17	49	0	0
6	16	0	0	18	52	0	0
7	19	0	0	19	55	0	0
8	22	0	0	20	58	0	0
9	25	0	0	21	61	0	0
10	28	0	0	22	64	0	0
11	31	0	0	23	67	0	0
12	34	0	0	24	70	0	0

**Table 2:** Receiver coordinates.