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Problem WP1_HSP2b

Purpose

Assess the accuracy of incorporation of attenuation.

Coordinate System

Right-handed Cartesian, *x* positive north, *y* positive east, *z* positive downward, all coordinates in meters.

Material Properties

Homogeneous viscoelastic space

v_p [m/s] at 2.5 Hz	v_s [m/s] at 2.5 Hz	density [kg/m^3]	Q_p	Q_s
6000	3464	2700	60	30

Tab. 1 Material parameters. Constant $Q(\omega)$ law is assumed.

Source

Point dislocation.
The only non-zero moment tensor component M_{xy} ($\Phi_S = 0°$, $\delta = 90°$, $\lambda = 0°$), which has value $M_0 = 10^{18}$ Nm .
Moment-rate time history is $M_0 \cdot \frac{t}{T^2} \exp\left(-\frac{t}{T}\right)$, where T = 0.1s.
Moment time history is $M_0 \cdot \left[1 - \left(1 + \frac{t}{T}\right) \exp\left(-\frac{t}{T}\right)\right]$, where T = 0.1s.

Receivers

Distant receivers, coordinates are in meters from source. The coordinates of the receivers are in the Tab. 2.
They are at a distance of twenty reference wavelengths λ_{ref} (1 Hz).
The receivers are located along the *y* axis, *xy* plane diagonal, body diagonal, and also along the line in general direction, see Fig. 1.

	x [m]	*y* [m]	*z* [m]		*x* [m]	*y* [m]	*z* [m]
1.	0	69 280	0	*3.*	39 999	39 999	39 999
2.	48 988	48 988	0	*4.*	55 548	37 032	18 516

Tab. 2 Coordinates of receivers

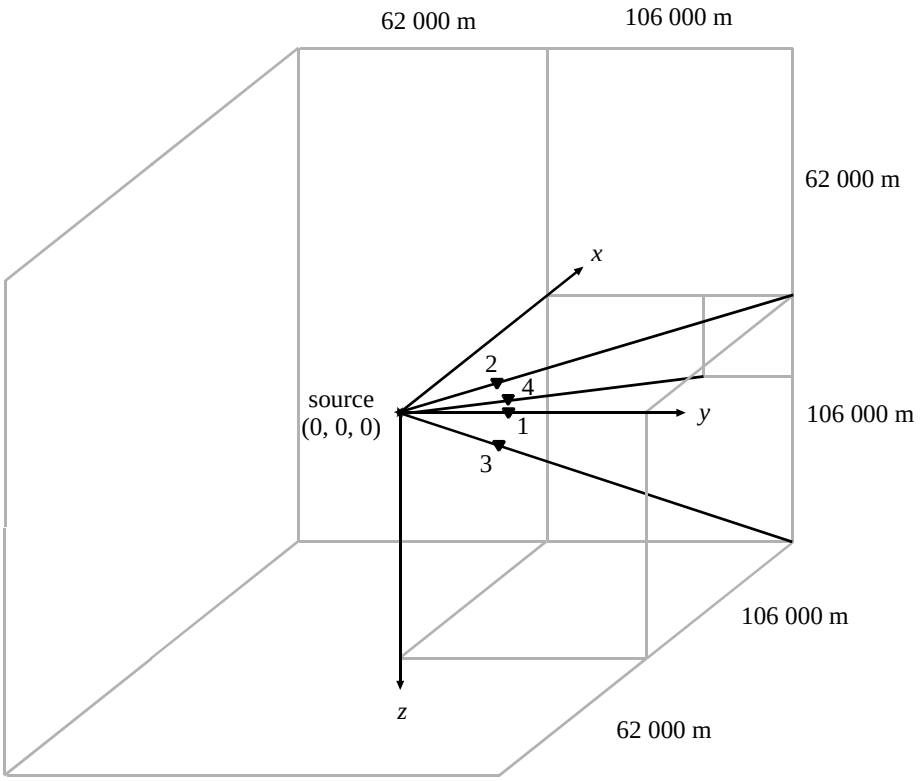

Fig. 1 Geometry for WP1_HSP2b

Time Window

Time window for all receivers is 10 - 22 s.

Frequency Range

The computation should be enough accurate for the minimum frequency window 0.036 – 5 Hz.

Other Information

Artificial boundary

The computational model must be large enough, so as the seismograms in the receivers do not contain waves, which are due to artificial boundaries of the model.

In the case of a numerical method, in which waves propagating from artificial boundaries of the model can be expected, the following distances should be sufficient: (assuming source at a point (0, 0, 0)) an orthogonal distance of boundaries from the source – 62 000 m in the negative directions of the *x*, *y* and *z* axes, and 106 000 m in the positive directions of the *x*, *y* and *z* axes from the source.

Output Information

Time histories of particle velocities (in meters/sec.) for all receivers.

Required time step is 0.02 s.

To ensure uniformity in any comparison, do not apply any additional filtering to time series apart from the specified source function.

Reference Solution

Analytical solution.

Accuracy Levels

Accuracy Levels evaluated at all defined receivers.

Accuracy Level	**EM** [%]	**PM** [%]
Level A	≤ 5	≤ 5
Level B	≤ 10	≤ 10
Level C	≤ 20	≤ 20

EM, PM – Single-valued envelope and phase misfits.
Kristekova et al. (2006)
http://www.nuquake.eu/Computer_Codes/Misfit_Criteria_KKMD.pdf